

OCTOBER, 1981
ISSUE NUMBER 39

PRICE \$3.00

THE ORIGINAL MAGAZINE FOR TRS-80™* OWNERS

H & E COMPUTRONICS INC.

*TRS-80™ IS A TRADEMARK OF TANDY CORPORATION



A beautiful match, the Smartmodem and the TRS-80. Your TRS-80 can talk with other computers, over the telephone lines. And with no acoustic losses or distortions. Access time-sharing systems and information utilities such as the Source,* CompuServe† and MicroNet.

Direct hook-up with no interference noises. The Smartmodem hooks to the telephone line just like a modular telephone, simply insert in a wall jack.

"Love at first sight" — your TRS-80 and the Smartmodem!

Brawny — because it does so many things. Auto-dial and auto-answer features built in. With the Smartmodem, your TRS-80 can automatically dial the telephone, answer the telephone, receive and transmit, and hang up the telephone. Completely unattended.

Pulse dialing or Touch-Tone. ** The Smartmodem can be connected to any telephone system in the U.S. because it allows pulse-dialing, Touch-Tone dialing or a combination of the two. FCC approved.

Program controllable in any language using ASCII character strings. This is a unique

Hayes Stack™

Microcomputer Component Systems

feature of the Hayes Smartmodem.

Brainy — because it does them all so simply. Seven LED indicators on the front panel give you visual signals of the status of the Smartmodem: MR — Modem Ready, SD — Send Data, CD — Carrier Detected, etc.

The audio monitor feature lets you "listen in" on the call being dialed and the connection made. You are immediately alerted to busy signals, wrong numbers, etc. **Over 30 different commands** can be entered directly from your TRS-80 keyboard, including the unique "Set" commands which allow you to select and change various optional parameters such as dialing speed, escape code character, length of

time for a dial tone, and number of rings to answer. There are 17 "Set" commands. *The Smartmodem is completely compatible with the Bell-103 type modems*, the type of modem most time-sharing systems have. Operation can be in full or half-duplex, with a transmission speed of 0-300 baud.

The Smartmodem is ready to "get-together" with your TRS-80.

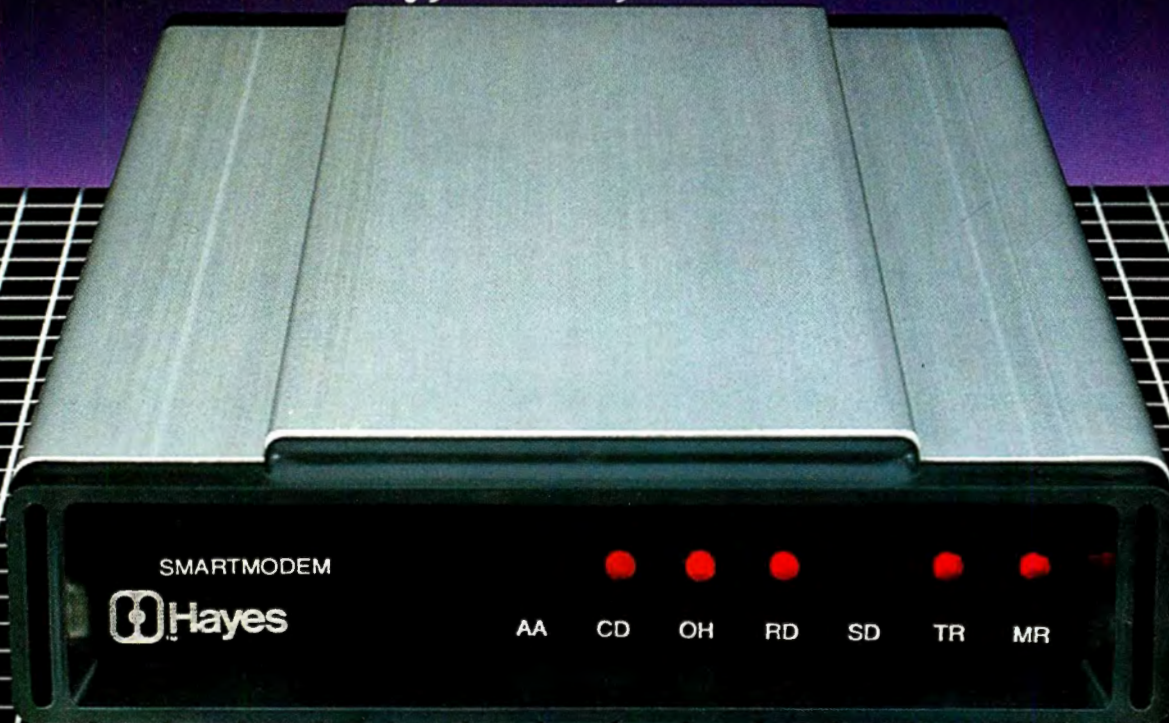
TRS-80 Model II and TRS-80 Color Computers have RS-232 serial ports and can immediately interface with the Smartmodem. Expansions that permit use of the Smartmodem with TRS-80 Model I and Model II are available through your TRS-80 dealer.

Match your TRS-80 with a Hayes Smartmodem for a sophisticated, high performed data communication system. Available at computer stores nationwide (except TRS-80 dealers) — call or write for the location nearest you. And don't settle for anything less than Hayes.

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and the Hayes Stack™ Smartmodem.
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BITS AND PIECES

Howard Y. Gosman

Color Brings Good Reaction

We are very encouraged by the excellent response from our readers to our first full color issue last month. We always like to hear from readers, and we are glad that you appreciate the extra effort it has taken to expand the magazine to bring you more articles, programs, and advertisements about products for the TRS-80 computers.

All this extra effort has cost our staff some time in attending to its usual responsibilities. Most letters send to "Questions and Answers" are still being answered within 60-90 days. It may take longer than this time to review programs or articles submitted, but you should re-

ceive an acknowledgement sooner.

New IBM and Xerox Computers

As you know from our Crystal Ball column, both IBM and Xerox, as well as some other giant corporations in the computer industry, have recently come out with new computers in the inexpensive price range aimed at the home or small business users. We want our readers to know that we are following these developments very closely, and we are giving serious consideration to supporting these machines. We don't know yet how we will do

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The *H & E COMPUTRONICS MONTHLY NEWS MAGAZINE* encourages comments, questions, and suggestions. H & E COMPUTRONICS will pay contributors for articles and programs published in the magazine.

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8 USEFUL PRODUCTS

NEW PRODUCT
Photograph not available
at time of printing.

① PRINTSWITCH

- Printer selector switch module allows two printers to be connected to a single TRS-80 system. Printer to be used is selected by switch.
- THE PROBLEM** of plugging and unplugging printer cables in order to select one printer or the other is eliminated by PRINTSWITCH.
- Small, unobtrusive design keeps your system *uncluttered*. Conveniently located switch allows instant access to either of your printers.
- Will work with any two similar or dissimilar parallel printers or printing systems including: dot matrix, daisy wheel, plotters, TRS-80 converted selectrics, etc.
- BUSINESS SYSTEMS** benefit from the ability to readily select one of two printers. For example a high speed dot matrix printer can be used for data, program listings and first drafts and a slower correspondence quality

printer utilized to generate letters, reports, etc.

•**SIMPLE TO CONNECT.** Plugs directly into the parallel printer port of your TRS-80 and provides an edge connector for each of your two printer cables.

•**PRINTSWITCH** comes completely assembled, tested, and ready to use with connector and instructions. *Printswitch A* is for model I and III, *PRINTSWITCH B* is for model II. Please specify when ordering. **PRINTS—SWITCH A or B.... ONLY \$59.00**

② PRINTER EXTENDER CABLE

- Adds 4 ft. to your existing printer cable. Our extension connects between your Expansion Interface and your present printer cable.
- High quality cable and gold plated contacts ensure reliable connection. **ONLY \$27.50**

③ TIMEDATE 80

- Complete, self contained "true" real time clock/calendar, *TIMEDATE 80* continues to keep accurate time and date when the computer is turned off or experiences a power failure.
- SET IT ONCE**, and it's two replaceable "AAA" batteries (not included) keep *TIMEDATE 80* running in excess of 3 years.
- The instant power is applied to the TRS-80, *TIMEDATE 80* provides accurate MO/DATE/YR, DAY of WEEK, HR:MIN:SEC and AM/PM information.
- REPLACES** the computer's internal clock. If power fails and then restores, only *TIMEDATE 80* will update the system with current *TIME* and *DATE* information, an impossibility with the computer's internal clock.
- QUARTZ CRYSTAL** based, *TIMEDATE 80* is accurate to within a few seconds per month.

•**PLUGS DIRECTLY** into the TRS-80 keyboard and gives the "TIMES" function even without an Expansion Interface. In disk systems, it plugs into the Expansion Interface. An optional "Y" connector provides for further expansion.

•*TIMEDATE 80*'s small size keeps the computer table tidy. If you have an Expansion Interface, *TIMEDATE 80* literally "DISAPPEARS" by slipping into the empty space in the bottom of the interface.

•Two sets of software, on cassette, come with *TIMEDATE 80*. "TIME-SET" is a step by step set of simple instructions for setting *TIMEDATE 80*. "TIMES" is a set of poke routines which patches any Disk Operating System to Level II *TIMES* to read *TIMEDATE 80* and is easily incorporated into any user software. "TIMES" will always print the time and date when LISTING a program—great for keeping track of revisions!

•**INVALUABLE** for providing accurate date and time information in business applications such as payrolls, receipts, etc.

•**FULLY ASSEMBLED** and tested, 90 day warranty, complete with instructions and software on cassette, **\$95.00**, "Y" option, add **\$12.00**.

④ EXPANDABUS

- Connect all of your TRS-80 Model I devices simultaneously on the 40-pin TRS-80 expansion bus. End the hassle of plugging and unplugging your accessories.
- ANY DEVICE** that normally plugs into the Model I TRS-80 keyboard edge connector can be plugged into *EXPANDABUS*.
- For those with an Expansion Interface, *EXPANDABUS* plugs into the Expansion Port connector (located on the left side panel, to the right of the printer port) or between the keyboard and expansion interface.
- EXPANDABUS* is made of the highest quality materials. All gold plated contacts and high grade ribbon cable ensure the most reliable connection possible.
- Protective covers are provided for each connector (as shown on X4 in

photograph) that can be removed and replaced as needed.

•**FOUR STANDARD CONFIGURATIONS** will fill almost any requirement. We recommend that you order the next greater configuration above that which your application demands so that any future expansion will be provided for.

•Two or more *EXPADABUS* cables can be ganged where more than five connections are needed. Custom configurations are also available. Call us.

•**X2...\$29 X3...\$44 X4...\$59 X5...\$74**

⑤ THE ALPHA GREEN SCREEN

IBM and all other mainframe houses use green screen monitors. The advantages of the green video screen are now widely known. Every TRS-80 user should enjoy the benefits that it provides.

•**THE ALPHA GREEN SCREEN** is the only CURVED screen MOLDED exactly to the picture tube shape. It is cut precisely to cover the exposed area of the tube.

•**THE FILTER MATERIAL** that we use is just the right shade and density. The result is a screen very pleasant to the eye.

•**IMAGE CONTRAST** is increased and screen legibility improved.

•Eye fatigue is reduced by our eye-saving green color and the enhanced readability of text.

•Your system takes on a distinctively professional look.

•**THE ALPHA GREEN SCREEN** is the easiest and fastest to install, no fitting, taping, or gluing necessary. Can be removed instantly for cleaning.

•**SATISFACTION GUARANTEED**—try the *ALPHA GREEN SCREEN* for 14 days. If, for any reason you are not delighted with it, return it for a full and immediate refund.

•**THE ALPHA GREEN SCREEN ONLY \$12.50** Please specify model

⑥ ANALOG-80:

8 DIGITAL MULTIMETERS PLUGGED INTO YOUR TRS-80!!! Measure Temperature, Voltage, Current, Light, Pressure, etc Very easy to use: for example, let's read input channel #4 10 OUT 0.4 "Selects input #4 and also starts the conversion 20 A=INP(0) "Puts the result in variable "A" Voila! Specifications Input range: 0-5V to 0-500V Each channel can be set to a different scale. Resolution 20mV (on 5V range). Accuracy 8 bits (5%). Port Address: jumper selectable. Plugs into keyboard bus or E/I (screen printer port). Assembled and tested 90 day warranty Complete with power supply, connector, manual **\$139**

⑦ INTERFACER-80:

INTERFACER-80: the most powerful Sense/Control module.
•8 industrial grade relays, single pole double throw isolated contacts: 2 Amp @ 125 Volts. TTL latched outputs are also accessible to drive external solid state relays.
•8 convenient LEDs constantly display the relay states.
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Simple "INP" commands read the status of the 8 inputs.
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⑧ CHAIN BREAKER

LET THE "CHAIN BREAKER" FREE YOUR MINI-DRIVES.

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THE CRYSTAL BALL

(News and Rumors of Interest to TRS-80™ Owners)

1. The New York Times financial section recently contained an article predicting that the new IBM personal computer would give Apple Computer some real competition, and might even knock Apple out of the market. In relation to many other comparable machines, the Apple III is definitely overpriced and full of technical problems (see last month's Crystal Ball).

There is no question that IBM will be a real competitor to all personal computers, but the price will still be higher than the Radio Shack Model III and Color Computer and many other personal computers. The basic price for a unit comparable to a 16K Model III without the video monitor (you use a television set) and cassette deck will be about \$1565. Adding a single disk drive, memory and other accessories will bring it to \$3005. A two-drive business system will be \$4500.

The IBM computer will be sold through Computerland dealers and Sears Roebuck and Co.'s new business machine stores, as well as IBM Product Centers. Its basic memory will be expandable up to 262K (compared to 48K for the TRS-80 Model III and 64K for the Model II).

2. Xerox is building a dealer force to sell its new \$3000 computer. It plans to establish a network with "hundreds of dealers", including office equipment dealers. The Xerox 820 is also called the Simply Amazing Machine (SAM), and will have an optional high-quality printer that lists for \$2990.

3. Tandon Corporation, which makes the disk drives used in

the TRS-80 Model III and other products for Radio Shack, is growing into one of the leading peripheral products manufacturers in the country. It began production of its patented double-sided heads for recording and retrieving data in 1977. In June 1979 it started production of complete double-sided floppy disk drives. It will soon be selling a Winchester-type hard disk drive which will probably be used by many other computer manufacturers in addition to Radio Shack.

4. All 2000 Computer Systems, Via dell'Alloro 22 r/a, 50123 Florence, Italy is now advertising a computer called the "Microleader 2000", which is an enhancement of the TRS-80 Model II that has two eight-inch double-sided double-density disk drives in the same space, next to the video display, that the Model II has one drive. Its disk drives are manufactured by none other than the previously mentioned Tandon Corp.

The principal feature of these drives is that they take up half the width of the Shugart SA800 drives used by the Model II. The major problem in designing the system was to produce software that could operate with the new double sided system, yet be completely compatible with the Model II. The operating system, which has now been developed, is a version of CP/M.

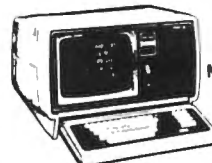
Sex and Personal Computers

5. The August 12th issue of "Management Information Systems Week", a trade publication for professional data processing managers, tells about a

meet a REAL PLUS



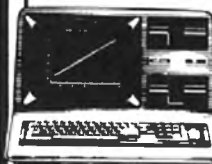
Color Computer 4K \$310
w/Ext. Basic 16K \$459



Model II 64K
\$3300



Atari 800 32K \$789



Model III 16K
\$839
2 DR + RS232C
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These are just a few of our many fine offers — computers, peripherals, modems, printers, disc drives and an unusual selection of package values. Call TOLL FREE today and check us out for price and warranty.

Factory warranties on Apple and Atari equipment. Other equipment carries manufacturer's warranty or Computer Plus 180 day extended warranty. Combined warranties carry Computer Plus 180 day warranty or original manufacturer's warranty.

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"computer consultant" being charged with running a prostitution ring using an Apple II computer to keep track of over 4,000 clients. Sargeant Dan Felix of the Santa Ana, California, police said that a Joseph Allen Harvey used the computer both for keeping track of billing and the girls. Computer files were also kept of "prank callers", names of "violent clientele", non-payers, and even vice officers who posed as customers. Harvey's programs have been impounded by the police.

6. The Wall Street Journal carried the following tidbit: More than 10,000 "sex manuals" have been sold in cassette and diskette form for home computer buffs by Syntonic Software Corp. of Houston. The product, a computer game called Interlude, is advertised as "the most stimulating computer game ever conceived." According to our calculations, this amounts to a sales volume of over a quarter of a million dollars. For those not familiar with Interlude, through a computer interview with you and your mate, a sexual scenario (complete with props) is set up for later participation. They range

from #1 ("A Bed of Roses") to #99 ("The Ultimate Experience"). The computer analyzes your likes, dislikes, and fantasies, and makes all the decisions for you. Interlude, incidentally, is sold by H & E Computronics. ■

continued from page 2

this. Perhaps we'll include information directly in this magazine, which up to this point has been just for TRS-80 owners. Perhaps we'll start another magazine. We may carry software products written for these computers.

As always, we would enjoy hearing from readers with ideas about this. How many TRS-80 owners are considering trading up to an IBM or Xerox computer? Is it just because of the reputations of these companies, or do you need the increased resources offered by the new machines?

Mediamix ETI²

A new device called the Mediamix ETI² can connect the IBM Electronic Typewriter Model 50, 60 or 75 to almost any computer made for low-cost, high-quality word processing. If you already have the typewriter, you have merely to add an inexpensive computer. If you already have the computer, here is the perfect alternative to a printer.

The typewriter features the highest quality printing available today with the exception of typesetting. It has a high resale value. It is more sophisticated than standard IBM Selectric typewriters, with features including automatic word and phrase underlining, centering, numerical column decimal alignment, paragraph indenting, electronic margin and tab setting, back-

continued on page 8

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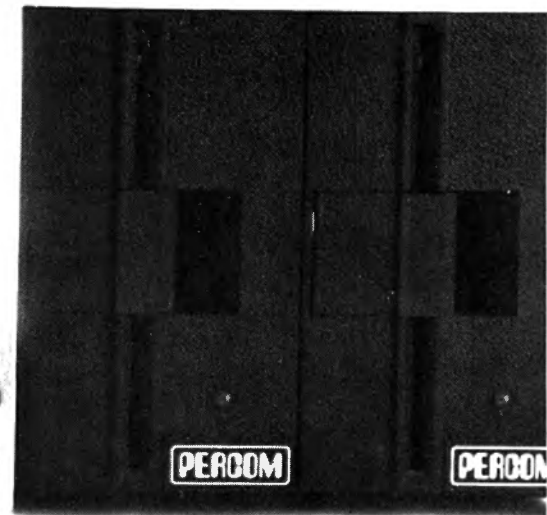
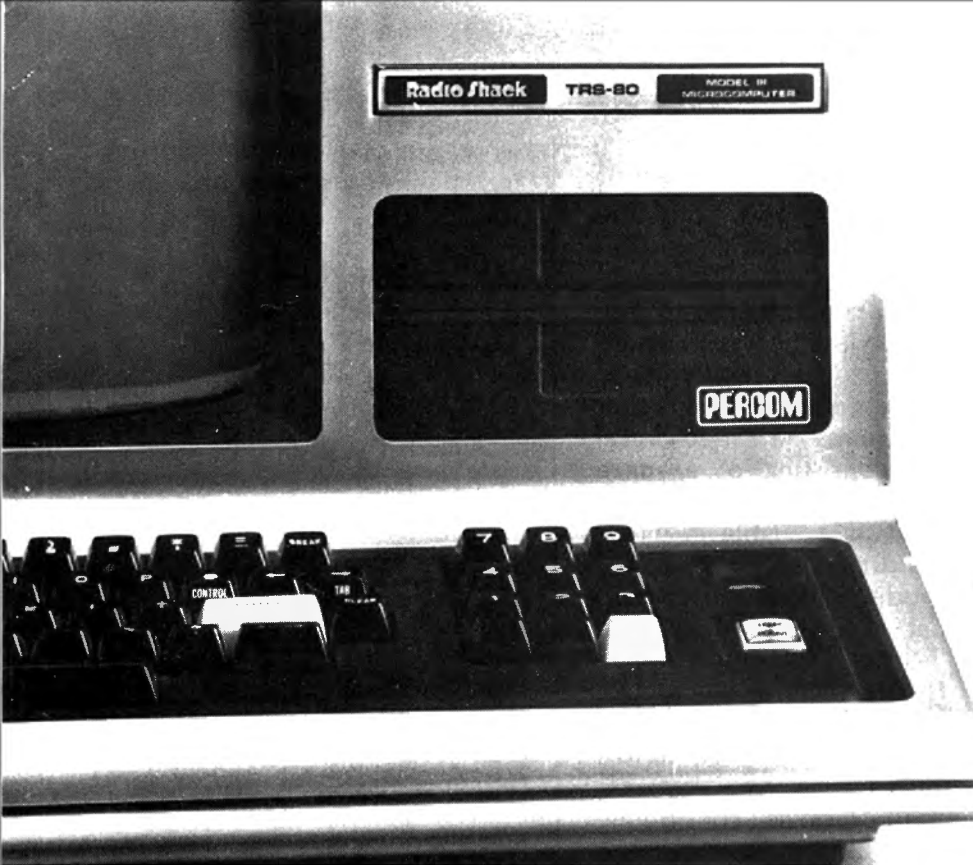
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continued from page 6

space and erase, and more. The type element contains 96 characters.

The device connects to the computer via the solid state electronic computer interface. The Selectric, on the other hand, requires a mechanical interface consisting of a maze of solenoids and plungers.

The ETI² is available in either a standard parallel or RS-232-C serial model. Among the computers that can be used are the Radio Shack TRS-80s, Apple, PET, Heath, Zenith, Microdata, Hewlett Packard, Atari, Data General, Northstar, IBM, Xerox, DEC and more.

Computronics is considering becoming a dealer for the Mediamix ETI². ■

LETTERS TO THE EDITOR

Cancel my Subscription

I am sending you a check for \$3.00 to cover invoice #ML53577, although I don't think I owe it to you, as this is postage on back issues of your magazine which was to be prepaid and would have been if I had started my subscription in 1978.

And the first 6 issues in 2 books is the biggest gyp I have had since I bought my TRS-80, which is still not doing what it is supposed to do. It seems that I really got a lemon.

Know anyone that wants to buy a Model I TRS-80 Expansion Interface, 2 Percom 40-track drives, 1 Microline 80 printer, NEWDOS++ when you return it, with all your magazines and all books from 80 Computronics (sic), Micronic Interface CW Radio and 2 teletype-writers receivers and printers. A bargain. I'll even buy their first bottle of Excedrin.

P.S. I don't guarantee that it will

work, nor does Radio Shack, who has been trying for nearly two years.

C. R. Goodin
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Warranties

I would like to take exception to a letter to the editor by Michael J. Sutton in the August 1981 issue of *Computronics*. Mr. Sutton states that when you buy from an authorized dealer, "there is no warranty." This is not true.

About a year ago I saw an advertisement for a Model I, Level II computer for \$685.00, no freight charge, no sales tax. The local Radio Shack price was \$849.00, plus sales tax of \$55.00, or a total price of \$904.00.

I took this ad to my local Radio Shack store and asked them how much discount I could get from them — and they wouldn't give me as much as \$1.00 off. They said I wouldn't get a warranty if I ordered from an "authorized dealer." I showed them the ad, and they admitted "yes, we would have to adhere to the warranty," as the ad specifically said "full Radio Shack warranty — take your computer to your local dealer."

So I sent in my order, saving \$219.00, and in ten days I received my computer, including the warranty, which I mailed to Fort Worth and received an acknowledgement. I had also ordered about \$150.00 (local price about \$190.00) worth of software. One of the tapes was bad. I took it to my closest Radio Shack computer store. They replaced it — no questions asked of where I had purchased it. I have since purchased an Expansion Interface and other software from an out-of-state "authorized" dealer, all with

continued on page 10

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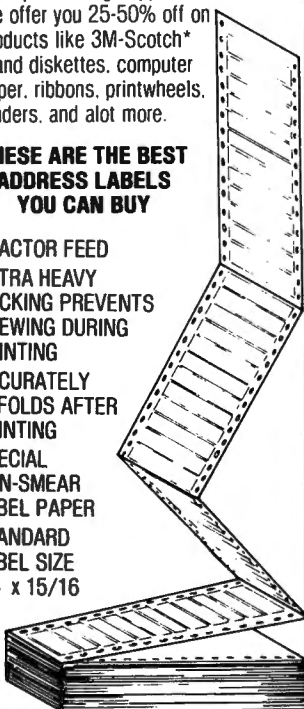
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continued from page 8

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Screen Printing under TRSDOS

In issue #37 in the "Letters to the Editor," Mr. Jay Cox referenced a letter from Mr. Gary R. Johnson, who wanted to print the disk directory on a line printer. Mr. Cox explained that if Mr. Johnson has a NEWDOS operating system, from Disk Basic he could enter CMD"DIR" and then use the JKL screen print utility. However, from NEWDOS, in the DOS or Basic mode, he can also use the "P" option, which will automatically direct the directory listing to the printer, using the format "DIR d P", where d is an optional disk designation. Note that other appended options may also be used.

If Mr. Johnson does not have NEWDOS but only TRSDOS, an effective but more primitive approach may be used:

- 1) Engage the printer and insure that it is on line.
- 2) Insert a sheet of paper into the printer.
- 3) Go to Disk Basic.
- 4) Enter the following line: POKE 16414,5: CMD"S". (You will notice that all video data is diverted to the printer and that the computer returns to DOS.)
- 5) Key in DIR :d (you will have to do this blind, as your entries are only printed after a carriage return is received by the printer).

Upon pressing the ENTER key, you will find the directory being faithfully printed on your paper. To recover video control, either RESET the computer, or return to Disk Basic and key in POKE 16414,88: POKE 16415,4. Now you will have the video back.

Incidentally, you may video print

LPRINT statements by entering POKE 16422,88: POKE 16423,4 and recover printer control by entering POKE 16422,141: POKE 16423,5. This LPRINT to PRINT and PRINT to LPRINT concept was originally published in issue #10, page 223 of *Computronics* (April 1979) in the "Bits and Pieces" section. Credit goes to Radio Shack Computer Services.

RS's new Disk Drive Head Cleaning Kit works great (remember their faulty first one?), and includes a modification for cleaning double-sided drives. Also, their Logic Flow Template is a very handy flow-chart development aid. I just bought one of the last remmining Voice Synthesizers for \$199.00 (old price was \$399.00). I also purchased a Vox Box for \$49.95 (normally \$169.95).

You might notice in Catalogue RSC-6 on page 9 the Series I Editor/Assembler for Model I and III going for \$29.95.

Notes to Tiny Pascal users: page 2 of the User's Manual states that there is no way to find out the file name of a tape-saved source or P-code file if it is forgotten. However, on page 24 of May 1981's TRS-80 MICROCOMPUTER NEWS (from RS), there is a quick Basic program that does the trick. (This program was intended to display the file name for Assembly Language source and object files.) It is reproduced below as a one-liner:

```
10 CLEAR 300 : INPUT #1,A$:
PRINT MID(A$,2,6)
```

To use it, load the cassette, press play, and RUN the above program.

Also, BYTE BOOKS has put out a book entitled "THE BYTE BOOK OF PASCAL" for \$25 hardbound. It seems to contain the father of Radio Shack's TINY PASCAL program. It includes BASIC, PASCAL, and 8080 code versions for a P-Code generator, a P-Code inter-

continued on page 12

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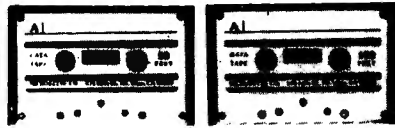
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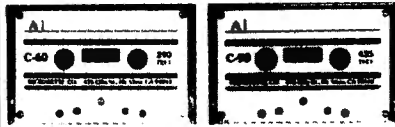
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continued from page 10

preter, and a P-Code to 8080 translator. (8080's instruction set is a subset of the Z-80's, and so 8080 code is Z-80 compatible. Note that RS's Disk EDTASM supports 8080 mnemonics.) The P-Code to 8080 aspect might be worth looking into, making a program interpreter independent. (This would, however, require a much smaller resident program, called a run-time library, for which two different versions are included in the book.) Also, with all of those source listings in the book, someone could probably come up with a way to convert TINY PASCAL to handle disk files, as RAM-WARE has done.

David R. Goben
HHB, 1/7 FA
Ft. Riley, KS 66442

Variable Records in TRSDOS 1.1

We have verified that variable length records, as described in the *Disk System Owner's Manual* for the Model III, do not work as described. There are apparently other errors in version 1.1 as well, which caused Radio Shack to withdraw it and replace it with version 1.2. If you are a Model III disk owner and do not yet have version 1.2 (or another disk operating system, such as DOS PLUS, you should get a copy from Radio Shack.

Bill Apresti
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* * * * *

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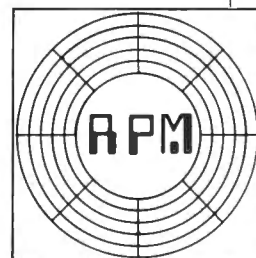
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PROGRAM PREVIEWS

A. A. Wicks

This Month: MAILING LIST from Howe Software and NEWSSCRIPT — UPDATE

MAILING LIST

The flexibility of a data base management program permits the development of mailing lists, in addition to many other reports; but because these programs are based on the ability to manipulate data in many different formats, I have never been enthusiastic in any that I have developed using a data base program as the vehicle. So I have always been on the lookout for an inexpensive dedicated mailing program — please note the word “inexpensive” — my mailing lists are quite modest. Those that have appeared in magazines have usually functioned well, but never quite did all that was desired, especially when it came to sorting and final printing of lists or labels.

It was a surprise to find a program advertised actually “under my nose” — right here in H & E. Computronics. Not expecting miracles, I asked if I might evaluate a copy of “TRS-80 Mailing List Program” written by none other than our Editor, Dr. Hubert S. Howe, Jr. Notwithstanding the authorship of the program, the review will be objective and honest.

First impressions are important, especially in software documentation, and this program provides a nice entree. Although the manual is brief, with just 11 single-sided pages, it is bound in a very presentable blue 10- by 11-inch padded three-ring, plastic binder. The disk accompanying the program is enclosed in a clear plastic insert. There is more than adequate space in the binder for a copy of the mailing lists that may be produced with the program. More on the content of the manual later.

The mailing list program will manage lists of up to 1005 names and addresses. This is accomplished on seven input lines, each line being a “field,” and each set of name, and address, being a “record.” A group of records is a file. If this sounds like data base management to you, you are quite correct. As was mentioned, though, it is the ease of manipulation that makes it attractive as a dedicated program.

All records in this program are kept in a single random file on disk. Each record in the file is referred to as a “sector,” and a display indicating the file sector being read or written is provided when this is happening. You may have wondered why the odd figure of 1005 names is the maximum. The maximum capacity of a single density formatted disk is 67 granules or 335 sectors. Each 256-byte sector contains three 85-byte logical records. Hence the maximum

capacity of 1005 name records. However, with only one disk drive the maximum will be 855 names — if all unnecessary system files are deleted. But enough of this technical information — our intent here is to address the business user, who does not necessarily care to understand the inner technical aspects of the program

It is quite possible to maintain a list of 10,000 or more names, as long as the list is divided into blocks of less than 1000 name records. These blocks could be broken out in groups that serve some useful purpose. As an example given in the manual suggests, magazine subscriptions could be broken into 12 blocks, for subscriptions expiring in the 12-month period. Other breaks come to mind — all names A through C, D through F, etc.

The disk provided with this program package has a Disk Operating System on it, and comes up “DOS READY.” You then go to BASIC and run “MAIL32/BAS” or “MAIL48/BAS” depending upon your memory size. There will be some further comments about this start-up toward the end of this review. Once that the “RUN” command is given, the display requests the name of the file to be initiated or looked for. The name entered will be used throughout the entire run. If you wish to change to another file, you exit the program (Option 6 on the Menu that is presented), and re-run, using the name to be selected. Following this, the Menu will be displayed, offering six Options, the last of which has just been mentioned.

The first option is to ADD OR CHANGE NAMES. The format for this function has been given some thought, and I found it to be very suitable for the average small business user. In sequence, it lists (and awaits entry of), Last Name, First Name, Company, Address, City, State, and Zip Code. All that is necessary for the input typist to do is to enter in the information requested (or skip by pressing ENTER only). If the information entered in the first six fields exceeds 73 characters, the display will advise how many characters have been exceeded, and a reduced entry will be required — abbreviated data may be the answer, but it is unlikely that this will be necessary. In the same sense, if the ZIP code exceeds seven characters, the message, “Maximum 7 characters in ZIP code,” will be shown. Having seven characters in the ZIP code was good thinking — this takes care of the Canadian postal

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code system (including the blank between alphanumeric groups). Completion of each record allows a correction opportunity before filing. Merely re-enter the line to be corrected, and press ENTER only, for lines without change. The data are then written to disk.

Another interesting facet of this program is the ability to use a comma or colon within the data. However, if this is desired the data line must be enclosed within quotation marks. On printout or display the quotation marks will not appear.

Upon printout for listing or labels the format has been designed to meet postal requirements, and no formatting on the part of the user is necessary. The format is:

```
(SEQ#) FIRSTNAME LASTNAME  
      COMPANY  
      ADDRESS  
      CITY STATE      ZIPCODE
```

The spacing between words is as shown. Printing of the sequence number shown is optional. All records have a sequence number automatically inserted as the record is entered. If the format shown does not suit the situation, spaces may be inserted wherever desired to produce different visual results. Note that the final printing has the first name before the last name — many mediocre mailing list programs do not permit this.

On an established file, names may be added or deleted (Option 3). Names added are always put at the end of a file. Actually, if there have been deletions the delete function also compresses the file, if that is desired. This frees the empty space in the file by moving the space to the end of the file where it may be overwritten by added data in the form of name records.

If a name record is to be changed it is merely overwritten by the new data that the change incurs. But to locate the name record to be changed you must know its sequence number. If you do not have a printed listing that includes the sequence number, merely request Option 2 — FIND AN INDIVIDUAL. Once this sequence number is entered (the first and last names as listed will do), the record is displayed and you then make your changes. Finding an individual record by the name method is slow, because the program must search the entire file name-by-name, making a comparison until an exact match is made with the one requested. Not impossible, but not recommended, either.

In a similar way, deletions may be made, using Option 3, but as stated, you have an opportunity to compress the file, too. Keep it in mind that there is no way to delete physical records from random files in Disk BASIC. Compressing a file changes all of the

sequence numbers following the first record deleted. It is not necessary, as far as the program operation is concerned, to compress files — it is just more economical of file space use.

We now come to what might be considered one of the most important functions of a dedicated mailing list program — sorting. A mailing list that may be sorted in a variety of useful ways is invaluable. The program author has done this part of the program well — probably due to his excellent knowledge in the field of machine language operations. The Sort may be performed on all of the records in the file according to the information in any field; and at extremely high speed. This is important, because a business office hardly needs coffee breaks while the computer is sorting five or six hundred names or cities.

Following the sort, the file may be printed in sorted order, and you will recall this could be by last name, or city, ZIP code, etc. There is one thing that this program will not do (and you must consider how important this is to your needs): it is not possible to perform a secondary sort. For instance, in sorting on last names, these will appear alphabetically A through Z. If there is more than one identical last name, the first name may appear out of order. There are more expensive programs that will do this, and most data base management programs of significance can manipulate these data in secondary order. The fact that this is not available must be considered a trade-off for simplicity of use in this program.

Option 5 allows printing of the file, or a portion thereof, either as previously sorted, or by sequence numbers. The file remains on disk in sorted order once it is sorted, so subsequent printings will be the same. The user should recognize that adding, deleting or changing records will undo the sorted sequence. This would require another sort, but with the speed with which this is done, this is not a problem.

There are a number of sub-options connected with printing, and these must be specified before printing begins. The first choice is "all" or "part" of the file. "Part" is declared by specifying first and last record numbers. Sequence numbers printed or not printed is the next choice. This is usually not desired for labels, but may be useful for lists and for reference in the event of changes. The final sub-option, and one which is very helpful, is for printing format specifications. No less than five formats are possible: labels in one, two, or three columns; the entire name record on one line (how much this has been needed !); and video display only.

The column formats for labels supports printing on commercially available label stock, and the program assumes that a new label starts every six lines. Should this not be the case, instructions are provided regarding changes to be made by editing no more than

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two lines in the program. Very detailed information is provided regarding tab positioning for more than single column printing of labels.

The manual is a good one, as brief as it is — but there is nothing left unsaid; which is a compliment to the writing. What is provided is clear and readily understood by non-technical persons, with the exception noted below. There are just a very few typographical errors and one trademark not acknowledged. The manual has been printed by the offset method from electric typewriter or daisy wheel printer, and is nicely formatted. The manual rates a 9, with 10 being the best.

The exception to clarity, mentioned in the preceding paragraph, is really surprising considering the overall quality of this software. The only instructions in the manual regarding getting the program up and running relate to transferring the program from a cassette to disk. This guidance is not incorrect — if the program was on cassette, which it is not. Assuming a user understood that perhaps this was left over from a cassette-supplied program, and took heart from the last sentence which states, "You are ready to run the program from disk," they would then put the disk in the drive and initiate the run. But it isn't all that easy — the program comes up with NEWDOS™ Version 2.1. Briefly, I had no problem because I called for a Directory listing, found that "MAIL32" and "MAIL48" were on the disk, and went from there. But I cannot help but think of an unknowledgeable buyer of this program being completely confused — especially when there is not one word of this in the manual. (Some might even wonder what a NEWDOS™ was.) There are no instructions for making a backup copy — it is assumed you have or know NEWDOS™ to do this. If you should purchase this program, keep this in mind; but I would encourage H & E Computronics to issue an insert with every copy of this program covering the actual loading and running procedures.

One other aspect of the program that I was disappointed with was that it apparently does not support lower-case operation, the Radio Shack modification. Personally, I would like to have it — it may not be important to others. A small but important improvement to the fields provided in the program would be to include an optional final line for "Country." Many users of mailing lists have contacts overseas or on this continent. Postal delays can occur if the country is not indicated in the address.

My last criticism is a minor one — throughout the program when there is user interface the expression "Type '1' if correct, else '0'," or similar, occurs whenever there is a "yes-no" choice. I think this program is sophisticated enough to come up with, "Is this correct (Y/N)?" or something of that nature. It is difficult for a casual user to convert digits into

affirmatives and negatives. (*Editor's note: these problems have been corrected in the most recent version of this program.*)

Regardless of the immediately foregoing comments, the program is a good one. It would be especially useful for any small business that sends out periodical mailings and wants the capability of making labels, together with the ability to change their lists. A home-operated business, such as many are engaged in today, supplying various products to families and other businesses, would find this ideal. Consultants, too, would find it excellent to keep their contacts informed. Considering the cost of this program, it is an excellent value.

MAILING LIST (for the TRS-80 Models 1 or 3) — Howe Software, 14 Lexington Road, New City, NY 10956. Available H & E Computronics, Inc. — \$69.95, includes program on disk (for 32K min.), manual.

NEWSSCRIPT — UPDATE

In the July issue, we reviewed a program called SUBSCRIPT and SUBEDIT, which had been revised and re-released as NEWSSCRIPT™ as we went to the printer. Unfortunately, the enhancements included in NEWSSCRIPT™ 6.0 could not be included at the time, and because the revisions to this program eliminate the deficiencies and criticisms given in that review, a brief updating is certainly in order. Several requests have been received asking for this.

If I were not enthusiastic about this program and its production, I would probably say so, and make no further reference to it; but I am very impressed, and would encourage its use. Incidentally, anyone who has purchased SUBSCRIPT and SUBEDIT, may purchase very nominally the revised NEWSSCRIPT™ by sending in their original disk with a fee for upgrading. The programs they now have and other subprograms that have been added are included within NEWSSCRIPT™. The upgrade includes a new manual, too, which alone is worth the cost, in my opinion.

Let's run through the changes and additions to the program. To properly evaluate these review remarks, you should probably refer to the original review in the July issue, too.

Primarily, the program now provides a full-screen editor. Now it is a word processor instead of just a line editor. The screen editor display is clean, attractive, and functional, with a top "Command" line, a left-side "Line Manipulation Area," and a large data (text) area. A tab indicator line is displayed at the top and bottom of the screen. (You will recall that tabbing is in tenths-of-an-inch in this program.)

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Mandatory space command. This is necessary when you are writing letters or papers that have certain words that are not to be broken-up. eg.: John P. Andhouser. This name can be made to be unbreakable to justify routines in the program.

Disk catalog. Now you can load your disk directory into memory and create a file of this information.

Reverse Indents or known as Hanging Indents.

changes, status, etc. No longer is ENTER required when typing lines — as soon as a video line is full on the screen, the text continues on the next line. And, if you are a hot-shot typist, try to type faster than NEWSSCRIPT™ can accept it — but hurry! — it can accept 750 keystrokes per second.

This is accomplished through a utility called “MIN,” which will be mentioned again later. In addition, the routine providing this unusual capability permits continued typing while the program is involved with some function not related to the keyboard, such as the so-called “garbage collection” time. So that you will now know what is happening though, a graphic type “C” will be displayed in the upper right screen position while this string compression is occurring. Keyboard character repeat has been added, as has a debounce control, if needed.

The program fully supports all fonts of the Line Printer IV and the Centronics™ 737 printers, as did the previous version. Now the new Centronics™ 739 and its Radio Shack equivalent are also supported, as well as the Epson™ MX-80 and MX-100. The Radio Shack Daisy Wheel II Printer will operate in proportional-spacing mode. In addition, many features of the NEC Spinwriters, the Diablo™, the C-Itoh Starwriters™, and many others are all accessible through NEWSSCRIPT™. Of course, if a printer does not have a function included in the program, NEWSSCRIPT™ certainly will not create it! Concerning graphics, any Epson™ printer with GRAFTRAX™ installed will print in italics when NEWSSCRIPT™ is used, if desired. Also, any Micro-line—printer (and Epson™ MX-80, MX-100) will print the full TRS-80 graphics, such as the drawing of logos or characters one-inch high, exactly as seen on the video monitor. Complete versions of the program are available for either the Model I or Model III TRS-80. EDIT, as previously reviewed can process 200 - 400 lines of text at a time, and an unlimited number of chained files can be processed as one document. NEWSSCRIPT™ has been tested and proved operational with TRSDOS™ 2.3, NEWDOS™, NEWDOS/80™, VTOS 4.0™, LDOS™, and Model III TRSDOS™ 1.1 systems.

Indexing is a new feature. An Index was needed for use with the previous manual, and now that the program has done most of the work for itself, the manual has an excellent Index. This means that any document you may produce may have an Index. But you must select the words you want indexed, of course, and the “marking” of these words or phrases for an Index may be a significant task, depending upon the words and the size of the document. A subprogram “GENINDEX” automates this work to a large extent; but in so doing it will search out and list *all* references to a word — which may not be desired. Nevertheless, using GENINDEX and a manually performed review, the unnecessary words may be culled quickly. A

procedure to create a Table of Contents is also available in this version.

Standard paragraphs or logos may be imbedded from one document into another with ease. In discussing this feature with a user of the program a short time ago, he stated that he was extremely pleased with it. His requirement is to move identical statements and paragraphs of extreme typing complexity (formulas mostly), in and out of various reports. He commented that his word-processing operator now does in minutes what used to require many repetitions.

The utility program mentioned, MIN, was formerly called MININIT, and was available as a separate program at extra cost. It is now within NEWSSCRIPT™ as a machine language utility program. (Programs within programs! which is typical of NEWSSCRIPT™, thus accounting for its extreme flexibility.) MIN functions with the keyboard, printer, and video display, and also has a lower-case driver, and screen print function. If you use NEWDOS™, pressing “JKL” still works, but these keys do not show up on the screen, nor in the input buffer interrupted by these key inputs. MIN may be used as a separate utility at any time, by calling it from DOS. The normal ROM keyboard routine is replaced by it, and its functions can be very pleasant to use. Once again, the functions of the Model III are available to the Model I user by this type of utility — similar to NEWBASIC, recently reviewed. (However, a very serious deficiency with NEWBASIC was the lower-case shift being inverted.)

Another utility “FITLINE” eases the task of converting files created under SUBSCRIPT and SUBEDIT. For instance, the latter program may have text lines beyond the video display line width. FITLINE “fits” them to the new video format.

Those of you who read the previous review know that I was impressed with the manual. “Impressed” is an understatement for my reaction to this edition. It definitely rates the first “10” given to any documentation reviewed in this column. It is in a class with the major manufacturers’ operating manuals, and exceeds many of them.

The old saw “you can’t judge a book by its cover” does not apply here. Starting with the binder and its cover (which *does* reflect the “book” in this case), we have a three-ring hard binder with top and bottom pressure keys, silk-screened logo on the outside, and one inside pocket. An inside card stock cover echoes the outside design and serves as a sheet lifter. A similar card stock inside back cover is provided. The format of the manual is identical to the SUBSCRIPT and SUBEDIT manual, but the contents have been greatly expanded. Page count is up to 161. The Index has corrected one previous complaint — page references

continued on page 34

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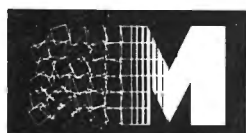
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Interface	Parallel	Parallel
Warranty	90 days	90 days
Printhead replacement	\$29.95	\$30
Cost	\$299	\$650

*Data source: Epson MX-80
Operation Manual



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CONVERTING FROM MODEL I TO MODEL II

Gordon Speer

I have just finished a week of learning how to use the TRS-80 Model II, and converting a series of programs from the Model I to the Model II. Since there are probably a lot of readers who are considering this change, I thought I'd share some observations with you.

KEYBOARD

I don't touch type, so the fact that Radio Shack moved a dozen or so keys to new locations doesn't bother me very much. The double and single quotes are down where the plus sign was. The rate sign is up in the top row now. The arrows are all over by the ten-key touchpad, which has about twenty keys now, but none of the arrows work like they did anyway, so I guess that's OK. Gone is the big wide cable that used to connect the keyboard and expansion interface. There is just one small cord to the keyboard, and it's long enough to allow you to move it around freely. The keys feel more solid, and at no time do I wonder whether or not the key has made contact, as I sometimes do on the Model I, except for the space bar, which feels like it isn't doing anything when it is depressed.

NEW KEYS

A tab key performs one of the functions of the old right arrow, and a control key gives an added function to each of the other keys. In spite of these additions, I find I am unable to do some of the things I have done on the Model I. One of these is a linefeed-carriage return, which is done with the down arrow on the Model I, although I managed to find a linefeed without a carriage return by using the CONTROL-J combination. Another is the up arrow, which I have used in other programs to return to the Menu, or, in general, to retreat back into the program. I haven't yet found out how to make that key work, although I managed to print an arrow on the screen using CHR\$(something).

VIDEO DISPLAY

The screen is sharp and clear, with 80 characters or 40 wide characters per line and 24 lines on the screen. When I started converting the "Print @" statements, I was in for a surprise. Where the Model I uses even numbers for locations in 32 character mode, the Model II uses the first half of the numbers of each row, and then overprints the same locations with the second half. To convert from one to the other, I needed a chart. There was just no other way. To center the old Model I display on the Model II screen requires moving down 4 lines and 4 giant spaces to the right, or 8 small spaces (40 or 80 character

modes). There is no single button to clear the display or to change from 40 to 80 character mode. CHR\$(30) and CHR\$(31) change the width of the characters, and CLS clears the screen, without reverting back to small characters.

MEMORY

There is no BASIC ROM chip in the keyboard. The BASIC is read into part of the RAM from the 8 inch floppy disk when necessary, and uses a large chunk of the memory. The 8 inch disk seems massive after using the little 5 inchers. I have single density 35-track mini-floppies, and I generally put the DOS (disk operating system) on all of them, which leaves about 50K of storage per disk. The 8 inch floppy of the Model II holds 500K, which still boggles my mind. If the Model II is available with less than 64K RAM, you would be well advised to get the 64K to start with. The DOS and BASIC use up almost 32K.

DISK DRIVE

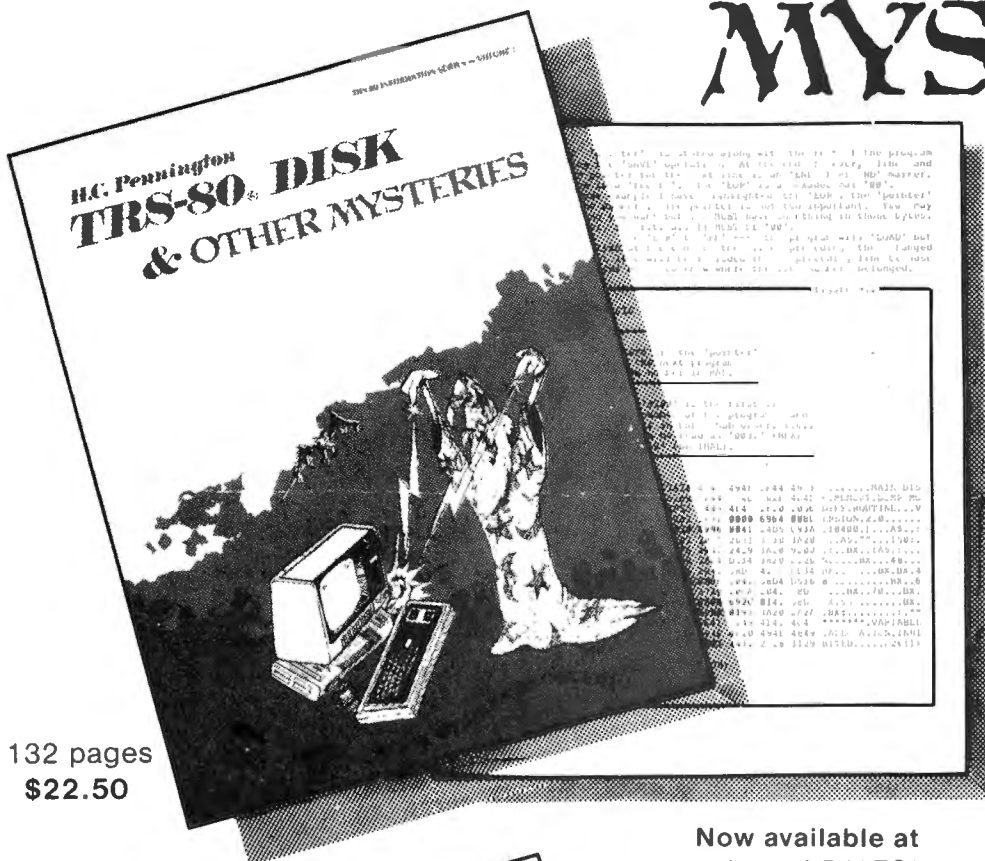
The door to the disk drive was designed by some athletic equipment company to build wrist and arm muscles. I could have closed it with one hand if there were only some place to put my thumb, but the only reasonable location is the release latch which hands the disk back to you. So I use both hands every time I put the disk into the drive. This would not have been often, except with only one drive, it requires about twelve disk swaps to make a backup. This leads me to an interesting observation: if you back up disks to be sure you have a copy in case of disk damage, the process of backing up the disk shouldn't cause the damage, but swapping disks twelve times puts a lot of wear and tear on the disks. There is so little memory and so much disk capacity that you must swap them many times to transfer data with only a single disk drive. A minimum system for any serious user should include a second drive. It's too bad the Fort Worth designers didn't include it in the same cabinet, as they did for the Model III.

STARTUP

You plug in the power cord and turn on the big switch and the sound of the cooling fan tells you something is happening. There is a built-in line filter, and without all those cords it seems much simpler than the Model I. The video screen tells you to insert the disk, and the drive is already turning! It turns all the time. No longer can I tell that the program is over because the disk drive has stopped. It never stops. And my disks are all noisy because someone left the

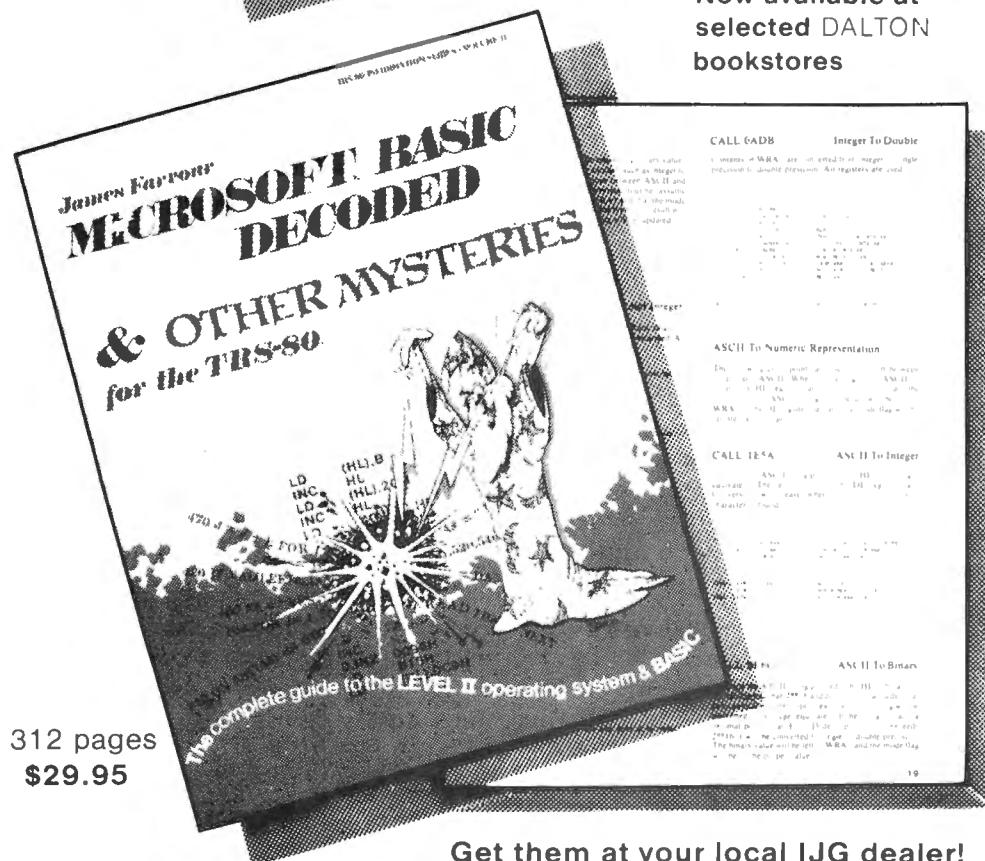
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DOCUMENTATION: Each diskette comes with 103 pages of documentation containing calling conventions, parameters, notes, examples, appendices and index.

PROVEN EXPERIENCE: The SSL is now being used daily in jet propulsion labs, private engineering and consulting firms, major universities and medical schools, government agencies and Fortune 500 corporations.

MINIMUM SYSTEM REQUIRED: TRS-80³ Model I 32K User-RAM, 1 disk drive, FORTRAN

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box lying on its side in the sun. Anyway, the DOS loads itself, proudly proclaims its copyright, and asks you what day it is (like Rip vanWinkle waking from his years of slumber). You must insert the date, and you may also put in the time. Every time a program is saved or a file is written the date is also recorded. This is a nice feature when you are cleaning up old files. At this point you are in the DOS and may elect a host of utilities. I have, at this point, done AUTO BASIC -F:3 which causes the DOS on each startup to enter BASIC. I wanted to do AUTO BASIC LOGO, which would run my first program, but unlike Model I, the Model II default is NO FILES, and I need three file buffers. You are allowed only one more operation after AUTO BASIC. Since the files must be counted when BASIC is loaded, this was the best I could do. You can protect high memory with something like: 40 CLEAR 20000, 61021 inside your first program, and go back and forth to the DOS with statements like: 60 SYSTEM "FORMS X" or 80 SYSTEM "RENAME INS OUTS". Anyhow, once you find yourself in BASIC everything seems pretty familiar.

BASIC

It's like an old friend when you use MODEL II disk basic. Almost everything works. There were just enough surprises to keep me searching through the big thick manual for answers, which were only sometimes there. The one that gave me the most trouble was one you probably will never notice, but it cost me a whole day of searching and three phone calls to Fort Worth (to no avail). We used to insure that a sequential file existed by opening it for output and then closing it. This does not destroy the contents of an existing file, but in the Model I it places an end-of-file marker in the now existing file. Then the file was opened for input and read until the EOF marker was reached. In the Model II, no EOF marker is placed in a file which is not written to, so although we could avoid the non-existent file error, we couldn't avoid the EOF error. All our programs had to be changed to cause the non-existent file error, trap out the error, and then open the file to write real data into it. It was a learning experience, to say the least.

TRANSFERRING PROGRAMS

We had two 5 inch disks full of programs and files which had to be transferred from the Model I to the Model II. To do this I visited my local Radio Shack Computer Center and found someone who could provide both machines and a connecting cord. The transfer takes place from the RS-232 serial interface of the Model I to the input port A of the Model II, and it requires appropriate software for both machines to

continued on page 28

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BOOK REVIEW

Dr. Peter Shenkin

DATA FILE PROGRAMMING IN BASIC by Leroy Finkel and Jerald Brown provides a second course in BASIC programming stressing the file handling necessary to develop just about any business programming application. The book is put out by John Wiley & Sons, Inc. and goes for the quite reasonable figure of \$9.95.

The book is written as a self-teaching guide and could probably be used effectively by anyone interested in file handling applications on a micro-computer when the language at hand is some dialect of Microsoft BASIC, TRS-80 BASIC, for example. The following quote from the preface describes the authors' intent:

"The book is designed for use by readers who have little or no experience using data files in BASIC (or elsewhere, for that matter). We take you slowly and carefully through experiences that 'teach by doing.' You will be asked to complete many programs and program segments. By doing so, you will learn the essentials and a lot more. If you already have data file experience, you can use this book to learn about data files in more depth."

How well did the authors succeed? Let the following review give our opinion.

Data files store information on some medium external to the main memory of the computer. In order to understand file handling techniques it is best for the student to first have some rudimentary knowledge of the programming language being used, BASIC in our case. Although the book being reviewed is designed as a second course in BASIC it is designed well enough so that the initial course need not have been very intensive. The first two chapters in the book offer a review of knowledge usually covered in a first programming course.

Chapter One is entitled "Writing BASIC programs for Clarity, Readability, and Logic." There is mention of making programs more readable by using a modular top to bottom approach with modules separated by descriptive REM statements. A very nice inclusion in this chapter is a sample module for beginning a program including definitions of variables and files. The reader could probably use the model to begin most of his programs. Programs beginning with a module as described in the book will be very well documented programs (though somewhat lengthy).

Chapter Two presents a 35 page review of introductory BASIC with the emphasis on those topics needed to understand the file handling techniques to be covered later. The statements covered are all part of Microsoft BASIC-80 and TRS-80 BASIC. It is

doubtful that the ordinary reader could use this chapter to learn BASIC, but someone who does have BASIC knowledge could use the chapter for review or to augment his or her knowledge of such topics as string manipulations, INPUT statements, IF THEN ELSE statements, FOR NEXT statements, multiple branching, etc. The sections on string manipulations are quite detailed for a book of this level.

The third chapter, entitled "BUILDING DATA ENTRY AND ERROR CHECKING ROUTINES", is really the beginning of the book. In order to be stored on cassette or diskette, the data must first be input at the keyboard. Can it be guaranteed that the data is accurate and of the correct type? In this chapter techniques are developed to make sure that entered data has the correct length (e.g., 5 digits for U. S. zip code), is of the correct type (e.g., numeric when numeric data is required), etc. Of course it is impossible to guard against all input errors, but this chapter gives techniques which should prove useful in endeavoring for accuracy. As in the rest of the book, real life examples are developed which aid in learning the material. The examples are developed step by step with questions for the reader until a complete module exists. In this chapter the examples involved data entry modules for a mailing list and for a type of order entry module. This chapter ends with a Self Test, as do all other chapters. The self tests, for which complete solutions are given for all problems, gives the reader a chance to test his or her knowledge and, additionally, to write some interesting programs.

Chapter Four is about "CREATING AND READING BACK SEQUENTIAL DATA FILES." The records in a sequential file are stored one after another on cassette or diskette and may only be accessed in this way, e.g. if we are interested in accessing the fifty-first record in a sequential data file we would have to access the fifty records which come before the desired record on the file in order to proceed. This may be compared to the situation in a random access file in which any record may be accessed directly if its position in the file is known. This chapter explains how data is stored on diskettes, how to count the number of records which will fit on a diskette, and the advantages and disadvantages of sequential vs. random access data files. Then the practical theory of sequential access files is developed. This development is keyed to Microsoft BASIC-80 and TRS-80 BASIC. All the cases left half-explained in the Microsoft and manufacturers' reference manuals are thoroughly covered. If there is a troublesome point, then it may be covered in several places. An example is the placement of explicit

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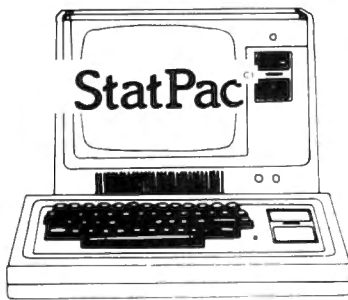
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commas into a disk data file to separate string variable values. When is this necessary and when not? Among the examples given in this chapter are programs to load inventory data onto a disk file, to read a property file from disk, to generate a grocery shopping list on disk and to display the list, and to maintain a small business customer credit file. There is even a nice letter writing example in the self test.

Chapter Five, "SEQUENTIAL DATA FILE UTILITY PROGRAMS", will be especially interesting to those users who wish to program using sequential files. This chapter contains many model programs to perform standard operations on sequential files. Among these commonly used operations are copying a sequential file, adding data to the end of a sequential file, editing or changing data in a existing sequential file, inserting new data into the middle of a existing sequential file, deleting data from an existing sequential file, and merging the contents of two sorted sequential files. Among the examples given in this chapter is a program to add to the grocery list from Chapter Four, a program to change, insert or delete data in the customer credit file of Chapter Four, and another letter writing program.

Sequential files stored on cassette tape behave much the same way as those on diskette, with the important exception that several disk files may be active at one

time on one diskette while it takes a separate tape recorder (tape drive) to access each cassette file. Chapter Six, "CASSETTE TAPE DATA FILES", addresses itself to those sequential data file techniques which prove useful to those who must use cassettes to store their data. As in other chapters, real life examples are given here. In fact, some of the examples of the previous chapters, such as the grocery example, are given here.

Chapter Seven, "RANDOM ACCESS DATA FILES", gives the rudiments of creating, copying and changing random access data files. The functions used in manipulating random access files in BASIC-80 and TRS-80 BASIC are thoroughly explained. These include PUT, GET, OPEN, LOF(), FIELD, LSET, RSET, CVS(), CVI(), CVD(), MKI\$(), MKS\$(), MKD\$(). The chapter begins with a discussion of what random access data files are and how they compare to sequential files. It is explained that the two greatest strengths of random access files versus sequential files are that in random access files it is quite easy to change data, and any record can be accessed quickly whether it is the first or last record in the file. Random access files do occupy more disk space than comparable sequential files, however. A good explanation of what buffers are and how they are used comes next. The FIELD, RSET and LSET functions are thoroughly covered, as well as PUT and

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GET. The use of the LOF() function is used to add records to a file. The techniques of storing numerical data into random access files are also covered. If the reader of this review has not worked with random access files and thus does not understand the above, let it be said that if your computer is equipped with a disk drive, the information in this chapter will permit you to create, edit and copy simple random access files, as well as to display the stored data. The self test contains a somewhat usable inventory example, where an inventory file is set up and the data is displayed.

Chapter Eight, "RANDOM ACCESS FILE APPLICATIONS", extends the inventory application of the previous chapter. In this chapter the file is accessed using a simple sequential "key" file. In addition, there is a "personal money management" application which is explained enough so that the interested reader may use it as the basis of a home budget system. The only thing missing is an examination of subrecords for those with older versions of Microsoft BASIC not permitting the setting of variable record lengths for random access applications. The TRS-80 Model I is equipped with such a version of BASIC. Both the TRS-80 Model II and Model III can set the record length for a random access file. This capability is important for

those who wish to use the disk space in an optimal manner. There is no information pertaining to how to set the length, even on these newer versions of BASIC. This information is simple to learn and would make a worthwhile addition to a second edition.

All in all, I found the text to be a refreshing change from the usual BASIC courses emphasizing business applications, in which "business" means in-memory financial calculations and the manipulation of in-memory data arrays. Most business data processing involves the use of data files stored externally. It's about time someone wrote a book on how to use these files on the microcomputers so much in use today. An advantage to TRS-80 owners is that just about all the programs should run on your machines without any changes. All it should take is some previous knowledge of BASIC and some time to work out the problems given in the book. Then the reader should find enjoyment in programming many interesting file storage applications for himself or herself.

At \$9.95 this book is a steal. ■

continued from page 24

establish the same baud rate for sending and receiving. (Baud rate is the number of bits per second of serial transmission, and it requires about 11 bits of time to send 8 bits or one byte of information. The extra three bits of time are for space and timing between bytes.) The only rate we could get to work on these two machines was 110 (10 bytes per second), which meant a 55K disk required 5500 seconds to copy, plus reading and writing time, or about two hours. It makes you appreciate the super speed of parallel transfer when you experience this difference.

DOS

I don't normally do much outside of BASIC, but the DOS features in the Model II are so inviting I just had to try a few of them. SYSTEM takes you back to DOS from BASIC, and LIB displays a generous library. SCREEN prints the entire screen contents on your printer, ANALYZE shows precisely where on the disk all your programs are stored, FREE shows a little chart of your disk with "X X X" for files and ". . ." for free space. There are lots of other features possible, like spooling, so the printer output can be saved and printed while you are typing or processing something else. All in all, as a schoolteacher, I'd give it an A-.

Gordon Speer
3304 Woodlawn Road
Sterling IL 61081 ■

BEGINNER'S CORNER

Sherry M. Taylor

PERIPHERALS AND PARAPHERNALIA FOR THE TRS-80

Part I: Printers

Here it is October already and it marks the 14th gathering of the BEGINNER'S CORNER. I hope 14 is a lucky number for you, and you don't get carried off by the hobgoblins this Halloween. I never particularly cared for Halloween. I am one of those uncreative mothers who is not good at making darling costumes for my children to wear trick-or-treating. I am not looking forward to the chore of getting them ready. Well, I hope you have better luck. Bolt the door, and remember, a vampire can enter your house only if invited!

With this session, we will start a discussion of the peripherals that are available for the TRS-80. First, before we do anything, we should define the word "peripheral." A peripheral is a unit or machine that is used in combination or conjunction with the computer but is not part of the computer itself. "Peripherals" include printers, cassette recorders, modems, ham radio receivers, disk drives, Stringy Floppies, expansion interfaces, voice synthesizers, Voxboxes, joysticks, light pens, music synthesizers, video displays, alternative power sources, typewriter interfaces, graphics boards, etc.

If you have a TRS-80, you already have two peripherals: The video display and the cassette recorder. While your computer will work without the video display, you won't be able to see what you are doing. You also know that you CAN use the computer

without the cassette recorder, but you would have to type in the program every time you use it. We can safely assume you have the video display and the cassette recorder, so we won't discuss these peripherals.

(Be forewarned! I will be giving you some new terms and their definitions. These are to acquaint you with the terms used in the advertisements in the magazines. You want to know what you are buying, don't you?)

A peripheral is to a computer as an attachment is to a vacuum cleaner. Depending on which attachment you are using, you can change the purpose of your computer, much the way the upholstery nozzle will make an upholstery cleaner out of the vacuum cleaner.

The first and most commonly added peripheral is a line printer. You will never find a more useful addition to your computer. There are several good printers on the market that are TRS-80 compatible, and they are available in all price ranges. How much you pay will depend on what you want your printer to do.

The most valuable use for a printer is in LISTING programs. Debugging a program is much easier if you can see a larger portion of it than 16 lines. For this job you can use the cheapest printer on the market. You do not usually care how the printout looks, just that you can read it.

Most users want a printer for word processing and printing reports. Typing letters and manuscripts on the video screen and editing them before printing saves

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time, effort, paper and sanity! Having to retype a page because of a left-out word on the bottom line COULD cause a preacher to say a few choice words, and you won't have to find the correction paper or rub holes in the page with the eraser. All of your corrections are made on the screen. You can even add a line or a whole paragraph. Then, when the text is exactly in the form you want it, send it to the printer. One perfect copy. (Well, almost perfect. You MIGHT be a lousy proofreader!)

If you use a printer for letters, manuscripts, or reports, you will have to take into account the type of print produced by the printer you are considering. The most common type of print is the dot matrix. "Dot-matrix" is a term used for the type of print made up of little dots, like the letters on your video screen.

Other printers that are more expensive will produce characters like those made on a regular typewriter. These are called "daisy-wheel" or "thimble" printers. The "daisy wheel" printer has formed letters at the ends of the "petals" of the daisy wheel. The wheel revolves and a small hammer presses the character onto the paper via the inked ribbon. The "thimble" print head works the same way, except that the "petals" form a thimble shape.

The method of placing the character on the paper is also a consideration in your decision. The most popular by far is the "impact method." The impact method is the same method used in an ordinary typewriter: The print head (or strikers) presses the character against an inked ribbon and onto the paper. This is used with both the dot matrix printer and the daisy wheel printer.

Another method is "thermal." A printer that uses this method uses a special paper that is coated with heat sensitive chemicals. The heated print head then presses the character onto the paper causing the chemicals to change color. Since this type of printer requires a special paper, it is more expensive to operate and is not practical for large work loads.

The third method of printing is the "electrostatic" method. This is much like the copy machine type of printing. It uses a special type of paper that is dusted with particles of finely powdered dry ink and the particles adhere only to the electrically charged areas. The paper is then heated, causing the ink to melt and become permanently fixed to the paper.

When deciding which printer you would like to add to your system, you will have to be aware of how that particular printer is connected to your computer. The two most common means are the "serial" and the "parallel" ports (connections.)

The "Serial" port is usually the RS-232 board or an equivalent. It sends signals to the printer one bit at a time, one after the other. The RS-232 is not a standard feature of the Model I or the Model III TRS-80. It will

have to be added to the expansion interface of the Model I or to the Model III internally. So, if you are considering a printer that has a serial interface, remember that the cost of the RS-232 board will be added to that of the printer.

The "parallel" port is the one already built into the TRS-80. It will send signals to the printer several bits at the same time. That is why the cable connecting the parallel printer to the computer is a wide ribbon-like cable with several wires running side-by-side (or parallel to each other.)

You will also be confronted by the choice of the type of form feed you want. There are three major types: Tractor feed, pin feed, and friction feed.

You are probably more familiar with "friction feed" than any of the others. Friction feed is used in the normal run-of-the-mill typewriters. In this type of feed, the pressure between the platen (that black cylinder that the keys strike against) and a roll bar underneath moves the paper through. With this type of feed, you could use single sheets of typewriter paper or stationery, rolled or fanfold paper. This could also accomodate spirit duplicator masters. (Very good for you teachers out there who have to print up worksheets and test papers.)

Pin feed printers have a little wheel of pins on each side of the platen. (They remind me of the studs on snow tires.) Because they are attached to the platen, they are not adjustable, so you can use only one width of paper. The paper has holes along the sides where the pins engage (like a gear) and pull the paper through the printer. The paper is usually fanfold, and the feed holes can be removed after printing by tearing along the perforations.

Tractor feed printers resemble the pin feed printers, but the tractor pins are not attached to a platen. They are a separate mechanism and can be adjusted to various widths of paper: from the very wide (14") report paper to the narrow (3 1/2") labels. Some printers offer a combination of two types of form feeds. For example, the Radio Shack Line Printer VI and the Epson MX-80F/T offers friction feed WITH tractor feed as a removable attachment.

As you have already guessed, there is a lot to know about printers before you go out to buy one. The first requirement is to know what you want it to do. Second, decide how much you will use it. (You certainly don't want to put a lot of money into a printer that would be used only occasionally. Likewise, you wouldn't want a cheap machine if you were going to be using it heavily, as in a business.) And, third, you must consider how much you can afford to pay. There is no magic formula that will help you decide which printer is best for your uses. All you can do is read and make the best choice you can.

continued on page 34

Spelling Errors? Does your TRS-80* wordprocessor need help?

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italizAtion, balanced quotation marks and parentheses, and and repeated words. In addition, it will produce a list of all unique words found in your document with the number of times each was used. Grammatik comes with a dictionary of commonly misused phrases and a dictionary of sexist terms. It also includes a complete set of utilities to build, sort, and merge phrase and jargon dictionaries of your own. Works with Scripsit, Electric Pencil, and other standard TRSDOS text files.

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Aspen Software programs are professional quality software tools developed for the TRS-80 by a Ph.D. in Computer Science. Other tools include:

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— **RATFOR**, a structured language preprocessor for Fortran developed at Bell Labs. Aspen Software Ratfor provides a number of extensions, including

"case" and "string". Includes complete manual with all the information needed to learn and write Ratfor programs. Requires FORTRAN.

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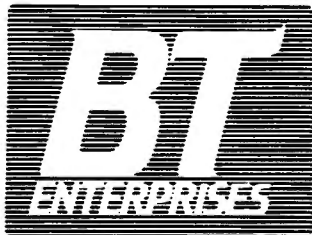
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That about covers printers. Next month we will tackle disk drives and the terms used in discussing them.

With this article, I would like to initiate a regular feature of this column: The **DICTIONARY OF COMPUTERESE**. Each month I will give you some "computerese" terms (some serious, some humorous) and give

you the definition and/or an explanation. I believe that a beginner's column not only should explain things in plain English, but should also acquaint you with terms you may see in other magazine articles that do not explain them.

Our first terms are as follows:

bit (Binary digit): A single character in a binary number, i.e. a 1 or a 0.

nybble: One half of a byte

byte: A group of binary digits usually operated upon as a unit. Ex. 8 bits make a byte.

gulp: A small group of bytes.

quiet error: (as opposed to "loud" ?) Errors that are quickly discovered and corrected before they spread throughout a process or system.

There's our first installment of the "DICTIONARY OF COMPUTERESE." Remember, sometimes I'll be putting in words that I have discovered just because I find them humorous. Others will be legitimate computer-oriented words. We might as well have fun with the language, all the foreigners do!

I'd like to recommend that you purchase a computer dictionary. Many common words have taken new meanings when applied to computers, and a normal dictionary would never give you those definitions. For example, look at the term above — "quiet error." You know what "quiet" means in normal English, and you know what an "error" is. But you would have a hard time coming up with the definition that the "computerese" language gives it. A good computer dictionary is very handy indeed.

Until next month, may all your errors be quiet!!

Sherry M. Taylor
322 So. 21st Street
Haines City, FL 33844
1-813-422-6523

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to Command and Control words are now provided (there was no Index before). A separate card for these words is again provided.

This is a good program, professionally executed and easy to understand and operate. Absolutely no knowledge of the internal workings or of programming the TRS-80 is required — making it ideal for word processing office personnel to use. If you already have **SUBSCRIPT** and **SUBEDIT**, I strongly recommend upgrading to **NEWSCRIPT™**. If you do not have a word processing program, or are dissatisfied with the one you are using — look closely at this one.

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TRS-80/RS-232 ADAPTER: Connect RS-232 printer to line printer port on Mod 3 or Mod 1 Expansion Interface. No software driver required. Leaves TRS-80 RS-232 port free for modem use. Set at 1200 baud, or specify rate (300-9600). TU8014, \$69.95.

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An all-inclusive version of this most popular of card games. This program both BIDS and PLAYS either contract or duplicate bridge. Depending on the contract, your computer opponents will either play the offense OR defense. If you bid too high, the computer will double your contract! BRIDGE 2.0 provides challenging entertainment for advanced players and is an excellent learning tool for the bridge novice. See the software review in 80 Software Critique.

HEARTS 1.5 (Available for all computers) Price: \$15.95 Cassette/\$19.95 Diskette
An exciting and entertaining computer version of this popular card game. Hearts is a trick-oriented game in which the purpose is not to take any hearts or the queen of spades. Play against two computer opponents who are armed with hard-to-beat playing strategies. HEARTS 1.5 is an ideal game for introducing the uninitiated (your spouse) to computers. See the software review in 80 Software Critique.

POKER PARTY (Available for all computers) Price: \$17.95 Cassette/\$21.95 Diskette
POKER PARTY is a draw poker simulation based on the book, POKER, by Oswald Jacoby. This is the most comprehensive version available for microcomputers. The party consists of yourself and six other (computer) players. Each of these players (you will get to know them) has a different personality in the form of a varying propensity to bluff or fold under pressure. Practice with POKER PARTY before going to that expensive game tonight! Apple Cassette and diskette versions require a 32 K (or larger) Apple II.

CRIBBAGE 2.0 (TRS-80 only) Price: \$14.95 Cassette/\$18.95 Diskette
This is simply the best cribbage game available. It is an excellent program for the cribbage player in search of a worthy opponent as well as for the novice wishing to improve his game. The graphics are superb and assembly language routines provide rapid execution. See the software review in 80 Software Critique.

EDUCATION

TEACHER'S PET I (Available for all computers) Price: \$11.95 Cassette/\$15.95 Diskette
This is the first of DYNACOMP's educational packages. Primarily intended for pre-school to grade 3, TEACHER'S PET provides the young student with counting practice, letter-word recognition and three levels of math skill exercises.

MORSE CODE TRAINER (TRS-80 only) Price: \$12.95 Cassette/\$16.95 Diskette
MORSE CODE TRAINER is designed to develop and improve your speed and accuracy in deciphering Morse Code. As such, MCT is an ideal software package for FCC test practice. The code sound is obtained through the earphone jack of any standard cassette recorder. You may choose the pitch of the tones as well as the word rate. Also, various modes of operation are available including number, punctuation and alphabet tests, as well as the keying of your own message. A very effective way to learn code!

THOUGHT PROVOKERS

FLIGHT SIMULATOR (Available for all computers) Price: \$17.95 Cassette/\$21.95 Diskette
A realistic and extensive mathematical simulation of take-off, flight and landing. The program utilizes aerodynamic equations and the characteristics of a real aircraft. You can practice instrument approaches and navigation using radial and compass headings. The more advanced flyer can also perform loops, half-rolls and similar aerobatic maneuvers. Although this program does not employ graphics, it is exciting and very addictive. See the software review in COMPUTRONICS.

VALDEZ (Available for all computers) Price: \$15.95 Cassette/\$19.95 Diskette
VALDEZ is a computer simulation of supertanker navigation in the Prince William Sound/Valdez Narrows region of Alaska. Included in this simulation is a realistic and extensive 256 x 256 element map, portions of which may be viewed using the ship's alphanumeric radar display. The motion of the ship itself is accurately modeled mathematically. The simulation also contains a model for the tidal patterns in the region, as well as other traffic (outgoing tankers and drifting icebergs). Chart your course from the Gulf of Alaska to Valdez Harbor! See the software review in 80 Software Critique.

NOMINOES JIGSAW (Atari, Apple and TRS-80 only) Price: \$16.95 Cassette/\$20.95 Diskette
A jigsaw puzzle on your computer! Complete the puzzle by selecting your pieces from a table consisting of 60 different shapes. NOMINOES JIGSAW is a virtuoso programming effort. The graphics are superlative and the puzzle will challenge you with its three levels of difficulty. Scoring is based upon the number of guesses taken and by the difficulty of the board set-up. The NOMINOES JIGSAW is available for TRS-80 color computer.

CHESS MASTER (North Star and TRS-80 only) Price: \$19.95 Cassette/\$23.95 Diskette
This complete and very powerful program provides five levels of play. It includes casting, en passant captures and the promotion of pawns. Additionally, the board may be preset before the start of play, permitting the examination of "book" plays. To maximize execution speed, the program is written in assembly language (by SOFTWARE SPECIALISTS of California). Full graphics are employed in the TRS-80 version, and two widths of alphanumeric display are provided to accommodate North Star users.

STARTRAK 3.2 (Available for all computers) Price: \$11.95 Cassette/\$15.95 Diskette
This is the classic Startrak simulation, but with several new features. For example, the Klingons now shoot at the Enterprise without warning while also attacking starbases in other quadrants. The Klingons also attack with both light and heavy cruisers and move when shot at! The situation is hectic when the Enterprise is besieged by three heavy cruisers and a starbase S.O.S. is received! The Klingons get even! See the software reviews in A.N.A.L.O.G., 80 Software Critique and Game Merchandising.

GAMES PACK I (Available for all computers) Price: \$10.95 Cassette/\$14.95 Diskette
GAMES PACK I contains the classic computer games of BLACK JACK, LUNAR LANDER, CRAPS, HORSE RACE, SWITCH and more. These games have been combined into one large program for ease in loading. They are individually accessed by a convenient menu. This collection is worth the price just for the DYNACOMP version of BLACK JACK.

GAMES PACK II (Available for all computers) Price: \$10.95 Cassette/\$14.95 Diskette
GAMES PACK II includes the games CRAZY EIGHTS, JOTTO, ACEY-DEUCEY, LIFE, WUMPUS and others. As with GAMES PACK I, all the games are loaded as one program and are called from a menu. You will particularly enjoy DYNACOMP's version of CRAZY EIGHTS.

Why pay \$7.95 or more per program when you can buy a DYNACOMP collection for just \$10.95?

STATISTICS AND ENGINEERING

DIGITAL FILTER (Available for all computers) Price: \$29.95 Cassette/\$33.95 Diskette
DIGITAL FILTER is a comprehensive data processing program which permits the user to design his own filter function or choose from a menu of filter forms. The filter forms are subsequently converted into non-recursive convolution coefficients which permit rapid data processing. In the explicit design mode the shape of the frequency transfer function is specified by directly entering points along the desired filter curve. In the menu mode, ideal low pass, high pass and bandpass filters may be approximated to varying degrees according to the number of points used in the calculation. These filters may optionally also be smoothed with a Hanning function. In addition, multi-stage Butterworth filters may be selected. Features of DIGITAL FILTER include plotting of the data before and after filtering, as well as display of the chosen filter functions. Also included are convenient data storage, retrieval and editing procedures.

FOURIER ANALYZER (Available for all computers) Price: \$16.95 Cassette/\$20.95 Diskette
Use this program to examine the frequency spectra of limited duration signals. The program features automatic scaling and plotting of the input data and results. Practical applications include the analysis of complicated patterns in such fields as electronics, communications and business.

TFA (Transfer Function Analyzer) Price: \$19.95 Cassette/\$23.95 Diskette
This is a special software package which may be used to evaluate the transfer functions of systems such as hi-fi amplifiers and filters by examining their response to pulsed inputs. TFA is a major modification of FOURIER ANALYZER and contains an engineering-oriented decibel versus log-frequency plot as well as data editing features. Whereas FOURIER ANALYZER is designed for educational and scientific use, TFA is an engineering tool. Available for all computers.

HARMONIC ANALYZER (Available for all computers) Price: \$24.95 Cassette/\$28.95 Diskette
HARMONIC ANALYZER was designed for the spectrum analysis of repetitive waveforms. Features include data file generation, editing and storage/retrieval as well as data and spectrum plotting. One particularly unique facility is that the input data need not be equally spaced or in order. The original data is sorted and a cubic spline interpolation is used to create the data file required by the FFT algorithm.

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COLOR COMPUTER CORNER

Joseph Rosenman

In this issue, I plan to review the EXTENDED BASIC 16K package for the Color Computer. First, I wish to glance into the near future. I just received the 1982 Radio Shack catalog and am happy to report that there is a disk system scheduled for release October 30. According to the Radio Shack catalog, the Color Computer will be able to support four 35-track double density drives. The first drive and interface (Radio Shack part number 26-3022) will retail for \$599. Additional drives (Radio Shack part number 26-3023) will cost \$399.00 each. The interface will plug into the ROM cartridge area of the Color Computer. It will contain the DOS on a ROM (and, I suspect, whatever additional RAM the DOS requires). Radio Shack also has released a 32K RAM upgrade (Radio Shack part number 21-3017) for \$149.00.

As soon as we can purchase a disk, I will review it. In the mean time, there are some thoughts and "unofficial" facts I want to share. I am told by a Radio Shack computer center manager that the Color Computer does not use the "standard" 4116 RAM chips, that special screwdrivers are needed to access the "inner compartments" of the computer, and that the keyboard is designed to "fall apart" when opened. Clearly, Radio Shack wishes to discourage users from any tinkering or simple modifications. I have seen evidence that there are indeed special screws inside. I can't see why Radio Shack would select a design that used RAM chips other than the inexpensive 4116 type, yet I doubt that the manager lied to me. As far as the keyboard is concerned — well, I thought something was a little funny about the new design. When I open up my own Color Computer to examine the insides (and I will someday), I will report my findings in this column.

There are several very interesting facts about the new disk system. I am not sure, but there is a chance that Radio Shack has used the same disk controller chip in the Color Computer as in the Model 3. If so, it should be possible to transfer diskettes between these systems (and between a Model 1 with the Percom Doubler 2 installed). The fact that the DOS is "resident on ROM" will maximize disk storage (no need to store DOS files on the disk), and will greatly improve run time (no new system modules will need to be read into memory). I only hope that the DOS is both perfect and powerful. Somehow, after the fiasco with Model 1 TRSDOS, I suspect that neither will be the case. I also suspect that one reason Radio Shack choose to use RAM on the interface cartridge (rather than the regular RAM in the Color Computer) was to "protect" the code from prying eyes. If there are any

problems with the DOS, it will be necessary to purchase new ROM chips in order to upgrade the DOS.

The addition of a disk system greatly adds to the power of the Color Computer. With the disk, the Color Computer has emerged as a viable low cost computer system that probably can "beat any price" as far as competition is concerned. Concerning any limitations and shortcomings that may exist, we will have to wait until we actually have a system to examine. If the Color Computer disk system does fall short of expectations, I predict some brisk competition between rival disk interfaces and DOSs. Indeed, Exatron already is offering a comparably priced system that provides compatibility with Model 1 systems.

EXTENDED COLOR BASIC

Extended Color Basic is to the Standard Color Basic what Level 2 Basic was to Level 1 Basic on the Model 1. Extended Basic adds a large number of commands (making it resemble Level 2 in its selection). Extended Basic also opens the door to high-resolution graphics on the Color Computer. In this review, I shall detail the special commands added to Extended Basic, describe the differences between Standard and Extended Basic, and explain the way that the Color Computer provides high resolution graphics.

Selected Extended Basic Commands

CIRCLE: Draw a circle with a specific location, size, color, and height/width ratio.

COLOR: Set the foreground and background colors.

DLOADM: Load a machine language tape at either 300 or 1200 baud.

DRAW: Draw a line with controlling information contained in a string.

GET: Read the graphic information of a given rectangle on the screen into an array.

HEX\$: Compute the hexadecimal value of a decimal number.

LINE: Draw a line with very detailed parameters.

PAINT: Change everything to a specific color, starting at a given location and ending at a specific color border.

PCLEAR: Reserve n pages of video memory for graphics.

PCLS: Clear graphic video memory.

PCOPY: Copy one page of graphic video memory to another.

PLAY: Create sound according to information contained in a string.

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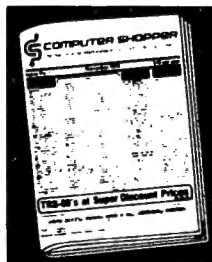
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PMODE: Determine the resolution and color of the graphic video memory.

PRESET: Reset a point of graphic video to the background color.

PSET: Set a specific point of graphic video to a specific color.

PUT: Display a rectangle in graphic video which was previously stored by a GET.

RENUM: Renumber the BASIC source program.

SCREEN: Select and display screen type (text or graphic) and screen color.

TIMER: Internal counter function used for delay loops.

The above list is not exhaustive, but serves to give an idea as to the scope and power of Extended Color Basic. Many of the standard functions that we are familiar with (from Level 2 Basic) that were missing have been added in the Extended Color Basic. Note that Standard Basic is an 8K ROM, and Extended Basic is a 16K ROM. Although I haven't yet tried, I believe that many of the non-disk programs for the Models I and III can easily be converted to Extended Color Basic. Those that "POKE" machine language routines into memory will NOT work! The reason is that the Color Computer is a 6809 based microcomputer, and the Models I and III are Z-80 based microcomputers. The machine code is incompatible.

The Standard Color Computer permits only a coarse graphic display. All graphics are generated in the normal video memory (or text memory). In my opinion, the Standard Color Computer serves as an introduction to color graphics, and as an interface for the ROM pack games. The Extended Color Computer throws open the doors for sophisticated graphic programming. (The addition of a disk system should encourage the development of some high-powered utility programs.) In order to use the high resolution display that the Color Computer can produce, special areas of memory need to be used. The remainder of this month's column will focus on the question of high resolution graphics.

Each "page" of graphic memory is 1.5K in size. It is possible to define from 1 to 8 pages of graphic memory using the PCLEAR command (the default is 4). This means that under normal circumstances (with a 16K machine), 6K memory is "skimmed off the top", leaving less than 10K free for program source code and variables. If the maximum graphic memory is reserved (8 pages = 12K), there will be less than 4K available for your program. (The new Radio Shack 32K RAM expansion is a welcome addition.) On the other hand, some of the commands in Extended Color Basic are so powerful that a few lines of code can create some extraordinary displays.

Whenever any non-graphic text needs to be displayed (i.e., a "?" from an INPUT or an error

message), the Color Computer will automatically revert to text screen display. The SCREEN command is used to switch over to graphic display. If you were to type the SCREEN command directly from a Basic prompt (i.e., SCREEN 1,1), the screen would "flash", then await your next command IN TEXT MODE. Why? Basic did what you asked (switched you into graphic mode), then indicated that it was ready for a new command by displaying its prompt. The display of the prompt forced the screen right back to text mode. If you were to type in the program:

```
10 SCREEN 1,1
20 GOTO 20
```

then you would see the graphic screen. Nothing would be happening, as the computer would be busy GOing TO 20. When (if) you hit BREAK, you would return to the text screen with the Basic prompt.

There are 5 "modes" of graphic display permitted (0-5). They are selected by the PMODE command. The modes are:

PMODE #	PAGES	COLORS?	COMBINATION
0	1	2	0 = Black/Green or 1 = Black/Buf
1	2	4	0 = Green/Yellow/Blue/Red or 1 = Buf/Cyan/Magenta/Orange
2	2	2	0 = Black/Green or 1 = Black/Buf
3	4	4	0 = Green/Yellow/Blue/Red or 1 = Buf/Cyan/Magenta/Orange
4	4	2	0 = Black/Green or 1 = Black/Buf

The resolution for the Color Computer is as follows:

```
Text          : 32 by 16
Text "Sets"   : 64 by 32
PMODE 0       : 128 by 96
PMODE 1       : 128 by 96
PMODE 2       : 128 by 192
PMODE 3       : 128 by 192
PMODE 4       : 256 by 192
```

The PMODE command also has a second parameter. This value specifies the starting page for the graphic video display (page 1-8). The graphics displayed on the various graphics pages is effected by such commands as PCLS, PSET, PRESET, CIRCLE, PAINT, COLOR, LINE, DRAW, etc. It is possible to display one page, while "creating" another. Then, the "new" page can be displayed while the "old" page is being modified. The total number of pages that can be shuffled around is determined by the value used in the PCLEAR com-

mand, and in the graphics resolution determined by the PMODE command. Since there are a total of eight pages, and anywhere between one and four pages are required for the different resolution modes, somewhere between two and eight pages should be available.

Although the Color Computer can produce eight colors, all eight are never available in the high resolution graphics mode. Either a predetermined set of four or two colors is selected by the SCREEN command (in conjunction with the current PMODE). Why the limitation on color selection? I'm not really sure. It is clear that the more colors desired, the more memory required. In the future, I hope to unravel this mystery. Also, I suspect that machine language programs might be able to use full resolution with full color range. The disk system will assist both myself and others with the experimentation of the color system.

There is an oddity in the system that I have noted. When color mode one is selected (the set that includes BUFF), strange things sometimes happen. As an example, RUN sample program number 1 "tunnel" included below. Since this is in PMODE 4, there should only be two colors. Yet, the tunnel is a beautiful multi-color design. Radio Shack mentions the fact that the color buff will take on "tinges" of other colors, but no explanation is made as to why this happens. Strange!

Along with the "tunnel" program, I also have included a demonstration program for the CIRCLE command. This program will produce three circles continuously shrinking (and re-appearing when they finally disappear). In addition, random sounds and graphic "dots" are produced. If the program is allowed to run for a while, the area outside the largest circle will fill up with a multi-colored "wash". Both of the programs are "studies". They don't "do" anything except demonstrate some of the features of the Color Computer (and produce some attractive displays). Next month, I plan to review some software available for the Color Computer. In December I hope to be able to review the disk system.

Program # 1: Tunnel

```
5 REM TUNNEL
10 PMODE 4,1
20 PCLS
30 SCREEN 1,1
40 FOR R=1 TO 100 STEP 10
50 CIRCLE(50+R,86+R/10),R
60 NEXT R
70 GOTO 70
80 END
```

continued on page 54

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VOL. 4 - DISASSEMBLED HANDBOOK FOR TRS-80

Robert M. Richardson

CHAPTER 7

W4UCH BAUDOT RADIO TELETYPE TRANSMIT AND RECEIVE SYSTEM PUTTING IT ALL TOGETHER

INTRODUCTION

Baudot radio teletype on the amateur radio bands can be a fascinating experience, a truly boring experience, and/or one that is most satisfying and intellectually gratifying, indeed.

Radio amateurs transmitting on RTTY run the gamut from polygot operators fluent in 3 or 4 languages to the rank beginner who hunts and pecks at his Model 15 TTY machine and misspells every other word. Whom you choose to work on the amateur bands is strictly your own decision. There are a number of American Radio Relay League sponsored RTTY nets that do the meritorious public service of solely forwarding (at NO CHARGE) messages from families and loved ones to servicemen overseas.

There are radio teletype nets that meet every Sunday morning to share experiences with Ron Lodewyck's Macrotronics M80 teletype system/program (\$149 and up). Just as in phone ham radio, there are nets that meet weekly (or daily) to serve the needs of the amateur radio fraternity that vary from the "Fundamentalist Bible Fellowship" net to AMSAT's (Amateur Satellite) group whose goal is to put up another bird as soon as possible. "You pays your money, and takes your choice," is an old western saying. The same is true for amateur radio teletype communication, except that it is FREE.

IF you assemble a computerized amateur radio teletype station, we cannot guarantee or promise you personal satisfaction with the contacts you make. It is entirely up to you and your own personal interests. What we can GUARANTEE, is that if you are patient, you will find another station or stations or net with interests virtually identical to your own, and this certainly justifies the search.

As starters, we suggest you "LISTEN" in on the various nets that meet regularly on the 40 and 20 meter amateur bands. A number provide interesting copy and will give you the "knack" of quickly tuning your amateur receiver from one RTTY station to another. IF you choose to use the modestly priced Flesher TU-170 terminal unit, you will be pleasantly surprised how quickly you will become adept at this "speed tuning" skill using the amazing "HUMAN EAR" to quickly identify the Baud rate being received and

the TU-170's tuning meter to set your receiver right on the money for perfect copy. We considered adding a RECEIVE program segment that tells you the SPEED being received and sets it up automatically, but Gridley has the need to feel PERSONALLY involved, so we intentionally left something for him to contribute to make the program WORK. Without ALL the Gridleys out there in computerland, (whom we truly appreciate), this Volume would never have been printed.

APPENDIX 4 OUTLINE

While LPRINTing out a modified and much longer version of this Chapter's object and source codes, we experienced a brief power line failure. With NO nicad backup power source, the TRS-80 naturally went off-line and reinitialized when power was restored.

How to keep from starting the LPRINT ALL OVER AGAIN from GO? Appendix 4 details ONE approach, albeit not very sophisticated. Nevertheless, it may be implemented in a few minutes time and may be a real time saver when needed. Rewriting the EDTASM program would be a much better solution.

APPENDIX 5 OUTLINE

Most all readers are familiar with one aspect or another of computer generated music, or at least aware of its existence. This appendix includes a program one may use to have software generate the 2125 cycle MARK signal and 2295 cycle SPACE for transmitting teletype. It utilizes the inexpensive Alpha Product Company "Music 80" printed circuit board/-connector module (\$39.95 and only 2" X 2") that plugs into either the keyboard or expansion interface on the Model I, or the external I/O bus ADAPTOR for the Model III.

We personally prefer the Circuit Board Specialists' crystal controlled AFSK generator OR the Flesher TU-170 terminal unit to accomplish this function, but this program may give you some food for thought for yet another approach. The little program in this appendix uses software to generate the Mark and Space audio tones for the RYRYRYRY test signal at 60 words per minute equivalent speed. You may either transmit its output on the amateur bands or record it on your cassette and play it back into your terminal unit/AFSK decoder using the program in this Chapter or Chapter 6 to receive and decode it.

EXPANDED COMMENTARY ON THE COMBINED BAUDOT RTTY PROGRAM

In Chapter 5, we pretty much let the program comments speak for themselves regarding the program flow and logic that created serial Baudot output at 60, 66, 75, and 100 words per minute equivalent speed, though we did include a simplified instruction segment for the RTTY operator who presumably had never operated a TRS-80 previously. We will not repeat the expanded commentary on the program's receive segment which was included in the last Chapter, but will expand the comments for the transmit segment and those modifications required to combine the transmit and receive programs as illustrated in the printout of the object and source codes (with comments) that follow.

Line 230: Ensures compatability with the Model III by both turning off the clock and enabling its external I/O bus after the CLS.

Lines 240-440: First send the program off to lines 360-440 which tell us we are in TRANSMIT MODE - WPM 60, skips a line, and then goes to the keyboard for instructions in line 440. After getting to the keyboard, if we press "SHIFT S" to change speed, the program jumps back to GO1 which asks us to input the speed desired, "60, 66, 75, or 100." Speed is stashed away in MEM at SPEED1 and then the SPD subroutine at line 510 is called.

Lines 510-1060: Load both the transmit AND receive speed variables into their appropriate MEM locations, for the speed you input. Most all will work fine business with the Model III and its faster clock, but to be EXACT, should be increased 15% for the III. Using the decrement BC timing loop in ROM at location 060H, these speed variables were first determined empirically (a sexy-scientific term meaning "cut and try"), for 60 words per minute equivalent speed, and then, in most cases, simply scaled down to the shorter bit lengths (in milliseconds) for the higher speeds. All have been tested with both the Model 15 teletype machine and Macrotronics M80 program and appear to be optimum. IF you have the excellent Mumford 3-speed clock modification, you MUST run the program at the standard clock frequency or you will transmitting and receiving at some rather weird Baud rates.

Lines 3610-3910: KYBD2 in line 3610 is the beginning of the command control center for this transmit program. It first tests SIGN2 to see if a prepared message is being transmitted, and if so, jumps off to SEND4 in line 6130 to continue sending it. If not, then line 3640 just sits there and waits for your keyboard input. IF the CLEAR key is pressed, your transmit/receive mode switch, then line 3660 sends the program off to the receive mode in line 6870. IF the spacebar is pressed, line 3680 jumps

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around the rest of the compares to line 3900 which displays it on video, and then to CNVERT in line 1120 which converts the ASCII 32 = space, eventually to Baudot serial code. Line 3690 tests your input for a SHIFT B, and if so, sends you back to BASIC in line 10370. IF you are using the Model I, change line 10420 to JP 072H. Either will work on the Model I, but the 072H is better practice. Line 3710 ignores the backspace, 3740 sends the program off to send a line feed AND carriage return as some TTY machines require BOTH. Line 3760 goes off to display the prepared message menu and line 3780 goes off to SEND5 which awaits your prepared message input WITHOUT displaying the menu. Line 3820 checks to see if the previous character transmitted was a letter or figure IF a figure, and if NOT a figure then lines 3920 to 4080 load SIGN1 in MEM with a 1 = figures, and then sends the figures Baudot character, before converting the keyboard input character to Baudot. Line 3840 discards any character greater than 90 (no Baudot equivalent), and lines 3850-3890 test if the previous character was a figure, and if so, change it to letters in lines 4090-4190. Lines 3610 to 3910 are the control center and as such, the most important lines in the program.

Lines 1120-1200: First save the "A" register in the stack, load SIGN3 from MEM which is the characters per line counter (remember, TTY machines have 72 characters per line), add 1 to to the value and stick it back in MEM, and then test to see if 72 characters have been transmitted. IF so, then off to AUTO1 in line 4270 where SIGN3 is zeroed out and a line feed followed by a carriage return is sent, before RETURNing. Line 1180 restores the "A" register with our ASCII keyboard character in it from the stack. Line 1190 checks to see if it is a space = ASCII 32, and if so, jumps off to space 1 in line 3290. IF the character is a letter, then lines 3320 and 3330 send a normal Baudot space character. IF the character is a figure, then lines 3340 and 3350 load MORE in MEM with a 2, telling the program to unshift, go from figures to letters, after the space is sent in lines 3380 and 3390. Lines 3400 to 3430 zero out MORE and send a Baudot letters character WHENEVER a space is sent AFTER any figures character. This is UNSHIFT on space.

Lines 1210-1290: Save the "A" register in the stack and check to see whether a letters or figures character was LAST transmitted. If it is the same (a letters or figures, again), then it continues on to line 1300 for letters or line 1850 for figures. If it is a change, from letters to figures, then line 1280 jumps off to FIGS1 in line 1830 which loads SIGN1, the letters/figures signpost, with a 1.

Lines 1300-2390: Simply match up the ASCII character value via compares and send it off to its appropriate counterpart in lines 2430 to 2940.

Lines 2430-2940: Load the "D" register with the decimal value of of the 5 bit Baudot character to be transmitted and then jump to SEND1 in line 2950.

Lines 2950-3060: Zeroes out the "L" register which is the program's bit counter and then sends the start bit by calling SPACE. Bit zero is then tested in line 2990 and if a one, then a mark is sent in line 2980 by calling MARK. If bit zero is a zero, then line 3000 sends a space in line 3000 by calling SPACE. The only reason for the two BIT 0,D instructions, since one would suffice, is it to make the timing as identical as possible for both mark and space. At low speeds, this is relatively unimportant, but for the higher speeds it does help. Line 3010 increments "L", the bit counter, checks to see if 5 bits have been transmitted in lines 3020-3030, and if NOT, shifts the "D" register one bit to the right, and jumps back to send the next bit in line 3060. IF all 5 bits have been transmitted, then line 3040 sends the program off to FINIS1 in line 3550.

Lines 3550-3600: Send TIME6, the stop bit. Then check to see if any MORE is to be sent. If so, send a carriage return or UNSHIFT on space.

Lines 3610-4480: Were (hopefully) covered earlier.

Lines 4490-6810: Are largely the prepared message subroutine that is called from the transmit mode by pressing SHIFT-UP ARROW which displays the menu illustrated on page 5-28. Conversely, the prepared messages may be transmitted WITHOUT the menu filling up and wiping out your video display by simply pressing UP ARROW and the letter for the message you wish to send.

By all means, change the messages to whatever suits your fancy AND USE YOUR OWN CALL LETTERS, HANDLE, QTH, etc. IF we begin receiving QSL cards from stations in Klondike, Alaska or Afganistan that we have never worked, we'll know someone is using the program UNCHANGED.

I'VE CHANGED IT. I'VE CHANGED IT ! ! !

Thank you, Gridley. You must have changed it quite recently, because we recently received this stack of QSL cards that were really meant for you.

SILENCE ! ! !

Let's take a quick run through the few modifications that have been made to the RECEIVE program to make it work with the merged TRANSMIT program.

Lines 6990 and 7100: Have been changed to JP Z,GO2 to send the program to the transmit mode whenever the CLEAR key, your transmit/receive switch is pressed, WHETHER OR NOT a RTTY is being received. This was a failing in the early Macrotronics M80 programs, and has hopefully been corrected.

A REMINDER: you cannot set up different transmit and receive speeds by pressing the BREAK key UNLESS an incoming signal is being received and printed out on video (garbage or otherwise is ok). The reason for this was intentional, since in most all

instances you will be transmitting and receiving at the same speed that you input in the TRANSMIT MODE. Hitting the break key in the TRANSMIT MODE will accomplish nothing at all and be ignored by the program just like any other key which does not have a Baudot equivalent or perform a programmed function. We wanted to make it somewhat difficult to set up different transmit and receive speeds, but not TOO difficult.

Lines 10590-10610: Have been moved from the end of the TRANSMIT program to the very end of the combined programs. Again, this is to allow you to use as much MEM as you wish and have available for inputting a prepared message via the "V" input a message command from the prepared message menu. There is no reason why this message could not be prepared separately, for instance with Electric Pencil and then stored on either cassette or disk.

After loading this program, load the message from cassette or disk into high memory, above 32767, and modify the "W" output prepared message command to access it. It takes a bit of doing, but is not all that difficult to accomplish. We'll save that goodie for a later Volume as this Chapter has run a bit long with the combined transmit and receive programs.

THIS CHAPTER'S PROGRAM IS AVAILABLE ON 35 TRACK DISK

Both the object code and source code with comments on 35 track disk is available for \$25 (US) postpaid first class mail in the US and Canada, and airmail to overseas addresses. Please specify the Volume 4, Chapter 7 program on your order. Sorry, but there is not enough demand to have the program recorded on on cassette by a professional-quality firm. Send orders to:

Richcraft Engineering Ltd.
Drawer 1065, Wahmeda Industrial Park
Chautauqua, New York 14722 USA

EDITOR'S NOTE

Because of space limitations, it is not possible to publish the source code for this program. It is available on disk, as specified above, and it is also contained in Volume 4 of the Disassembled Handbook for TRS-80, which is now available as a complete book.

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 - b) Turn off RTS,
 - c) Receive data only from terminal,
 - d) Receive data only from host,
 - e) Send data only to host,
 - f) Send data only to terminal,
 - g) Operate in dumb terminal mode,
 - h) Operate in ST80™ mode,
 - i) Check CTS status. (clear to send)

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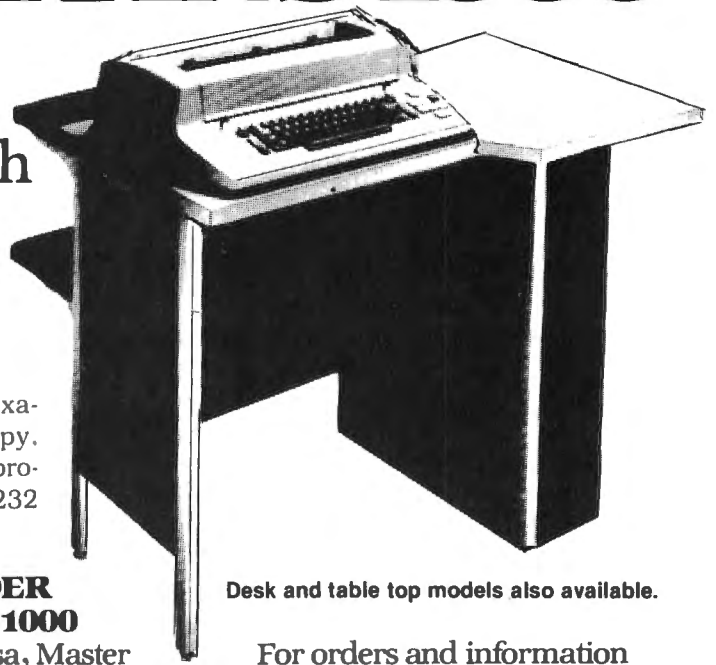
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MORSE CODE AND BAUDOT RTTY PROGRAMS CALLING EACH OTHER IN MEM

Is not all that complicated or difficult, especially if you are using disk to load them.

WHO WOULD WANT TO DO A CRAZY THING LIKE THAT ? ? ?

Well Gridley, lots of experienced radio amateurs might like to be able to do so. After all, the F.C.C. requires that each station, whether operating phone, Morse, or radio teletype, identify itself and the station it is working every 10 minutes. If operating RTTY, the identification may be in Morse code as long as the frequency shift is 100 cycles or more. Why not use the SPACE frequency for keying this I.D. in Morse with the Morse program appropriately modified?

I NEVER THOUGHT OF THAT. WHY DID'NT YOU MENTION IT BEFORE ? ?

You did not ask, Gridley. Seriously, most Editor/Assemblers will not allow you to concatenate and ASSEMBLE Chapter 2's Morse transmit program along with this Chapter's program, since it is a bit too long, so here is how we skin that cat; sorry about that Harlequin and R/C — its only an expression.

1. Change the ORG, origin, to say 27000 decimal

for the Morse program and DELETE all the extraneous messages except M and N, plus ALL the type ahead routine. As such, it will be < 1000 bytes decimal total and fit beneath this Chapter's program which starts at 28000 decimal. Load them separately.

2. Modify this Chapter's program so that when in the TRANSMIT MODE, pressing the @ key will send you to the Morse program's "M" input a message subroutine and pressing the * key will send it in MORSE. In the "M" Morse mode, simply input your call sign "DE" the other station's call sign. That's it OM.

CONCLUSION OF CHAPTER 7

Working Baudot radio teletype on the amateur bands can be great fun, indeed. We found the modest effort required to assemble a working station not as difficult or tedious as we had previously imagined it would be. The factory assembled and tested Flesher TU-170 worked the "first" time it was plugged in using the program from Chapter 6. Actually, it worked quite a bit better than some of the "homebrew" terminal units we had constructed. We highly recommend this modestly priced, but extremely well built and tested TU.

HINTS AND KINKS

You can easily modify the RECEIVE MODE program to allow somewhat greater mistuning of the receiver. It yields faster "lock-on" to mistuned, weak, or fading signals with the following changes to the RECEIVE MODE section of the program.

```
06970 RG02   LD     A,(14400)      ;CLEAR KEY ROW IN MEM
07020         JP     Z,RG02         ;IF SO, GO LOOK AGAIN
07070         JP     Z,RG02         ;IF SO, GO LOOK AGAIN
```

This minor modification removes the 1/2 second delay in lines 6950 and 6960 from the signal acquisition loops in lines 7020 and 7070. The 1/2 second delay is primarily to keep the CLEAR key (your combination transmit/receive selector switch) from performing a double jump BACK TO TRANSMIT MODE when pressed.

VAR/80 OR INTERFACER 2 AUTOMATIC ANTENNA RELAY SWITCHING

Just as we used the cassette relay in Chapter 4 to key a small relay to control your transmitter, receiver, and antenna relay, we can of course use the latching relay in either the VAR/80 or Interfacer at position DBO zero to do exactly the same thing, if desired. This relay will handle 3 amps at 110/120 VAC, so no buffer relay is required. The following additions and modifications to the program will do the switching automatically whenever you press the CLEAR key.

```
ADD - LINE 00365   LD     A,1      ;WILL LATCH DBO ZERO
ADD - LINE 00366   OUT    (0),A    ;RELAY ON THE VAR/80
CHANGE- LINE 03070 LD     A,5      ;1=2125 HZ 5=2295
HZ
CHANGE- LINE 03120 LD     A,1      ;1=2125 HZ
5=2295 HZ
CHANGE- LINE 03490 LD     A,1      ;1=2125 HZ
5=2295 HZ
ADD - LINE 06875   LD     A,0      ;TURN 'OFF' DBO
ZERO
ADD - LINE 06876   OUT    (0),A    ;RELAY ON THE
VAR/80
ADD - LINE 10575   LD     A,1      ;TO KEEP
MODEL3 MODS
ADD - LINE 10576   OUT    (0),A    ;FROM
SWITCHING RELAY
```

Though the Model III instructions in lines 10540-10570 would normally "unlatch" the VAR/80 relay at position DBO zero, the program zaps through these lines so quickly that the relay never really moves. ■

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MODEL III CORNER

Hubert S. Howe, Jr.

This month we present a selection of programs and hints submitted by readers.

SYSTEM UTILITY PROGRAM

We were having a difficult time getting the system to switch to the 500 baud tape input once we had gotten into the DOS. This program is a result of that effort. Several other utility features were incorporated into the program at the same time to make it more versatile. In the cursor modification section, you may enter an asterisk to signify that you wish to enter a code that is not among those on the display. I hope that this will be of use to readers using a Model III.

```
10 ' PROGRAM MOD3FX      MIKE HARGIS
20 CLS: PRINT @ 79,CHR$(188);STRING$(34,140);CHR$(188)
30 POKE 15538,191: POKE 15503,191
40 PRINT @ 207,CHR$(143);STRING$(34,140);CHR$(143)
50 PRINT @ 149,"SYSTEM UTILITY PROGRAM";: A=PEEK(15538)*85+177
60 PRINT @ 402,"1) CASSETTE SPEED MODIFICATION"
70 PRINT @ 530,"2) CURSOR DISPLAY MODIFICATION"
80 PRINT @ 658,"3) END UTILITY PROGRAM"
90 PRINT @ 977,"PRESS TYPE OF SELECTION NUMBER";: I$=""
100 I$=INKEY$: IF I$="" THEN 100 ELSE IF I$<"1" AND I$<"2"
AND I$<"3" THEN I$="": GOTO 100
```

```
110 PTR=VAL(I$): IF PTR=3 THEN CLS: END ELSE IF PTR=2 THEN 190
120 PRINT @ 256,CHR$(31): PRINT @ 404,"H - HIGH BAUD RATE (1500)"
130 PRINT @ 532,"L - LOW BAUD RATE (500)"
140 PRINT @ 977,"PRESS DESIRED SPEED CHARACTER";: I$=""
150 I$=INKEY$: IF I$="" THEN 150
160 IF I$<"H" AND I$<"L" THEN I$="": GOTO 150
170 IF I$="H" THEN VL=3 ELSE VL=0
180 POKE 16913,VL: PRINT @ 256,CHR$(31): GOTO 30
190 PRINT @ 256,CHR$(31);
200 FOR J1=1 TO 4: FOR L1=113+16*J1 TO 128+16*J1
210 PRINT @ (124+128*J1+(L1-(112+16*J1))*4),L1-100
220 POKE 15484+128*J1+(L1-(112+16*J1))*4,L1: NEXT L1,J1
230 PRINT @ 699," "
240 PRINT @ 773, "ENTER THE DESIRED 2-DIGIT NUMBER FOR CURSOR
CODE - ";
250 FOR K1=1 TO 2: I$=""
260 I$=INKEY$: IF I$="" AND K1=1 THEN 370
270 IF I$="" THEN 260
280 IF I$<"0" OR I$>"9" THEN 260
290 POKE 16183+K1,ASC(I$): M$=M$+I$: NEXT K1
300 CUR=VAL(M$)+100: IF CUR>128 AND CUR<192 THEN 320
310 M$="": I$="": GOTO 240
320 POKE A+7,CUR: PRINT @ 910,"DO YOU WANT A BLINKING CURSOR
(Y/N)?";: I$=""
330 I$=INKEY$: IF I$="" THEN 330
340 IF I$<"Y" AND I$<"N" THEN 330
350 IF I$="Y" THEN POKE A,0 ELSE POKE A,1
360 PRINT @ 256,CHR$(31): GOTO 30
370 PRINT @ 825,"";: INPUT CUR: GOTO 320
```

(Thanks to Michael K. Hargis, Route 3, Box 284, Bay Minette, AL 36507)

™TRS80 color

From the January 1981 issue of the CSRA Computer Club newsletter:

There was some amusement at the November meeting when the Radio Shack representatives stated that the software in the ROM cartridges could not be copied. This month's 68 Micro Journal reported they had disassembled the programs on ROM by covering some of the connector pins with tape. They promise details next month. Never tell a hobbyist something can't be done! This magazine seems to be the only source so far of technical informations on the TRS-80 color computer®. Devoted to SS-50 6800 and 6809 machines up to now, 68 Micro Journal plans to include the TRS-80 6809 unit in future issues.

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Programs that Work on the Model III

I have finally received my Model III with 48K RAM and two non-Radio Shack disk drives. At the same time I received the NEWDOS/80 disk operating system for the Model I. I am delighted with both acquisitions, and would like to share the information I have been able to develop regarding machine language programs:

1. Programs That Work on the Model III

- | | |
|------------------|--|
| ADVENTO | from your free cassette works fine. (It is written in U/L case). |
| MEMORY TEST | from your free cassette, except that checksums for ROM test are different. Refer to June 1981 issue of <i>Computronics</i> . |
| EDITOR/ASSEMBLER | by Microsoft appears to work all right, but I haven't used it much. |
| Z-BUG | by Microsoft works fine. |
| CHECKERS 80 | Radio Shack's. Works fine. |



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Mod 3 Cat # 1210-20 \$29.95

For Mod 1 EDTASM source files:
Tape Cat # 1010-30 \$24.95
Disk Cat # 1010-31 \$34.95
(Disk version shipped on tape.)

M-ZAL: DISK EDITOR/ASSEMBLER: Modular Assembler Language development system includes full screen text editor, multi-pass assembler, and object module linker. Allows 8 character symbols and source file chaining/nesting with *INCLUDE cmd. Full support for relocation and global symbols. Symbol table with cross reference. Req. 32K Disk system.

Mod 1 Cat # 1050-10 \$149.00
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XBUG: DEBUGGING TOOL & MONITOR: Display/Modify memory and regs. Set up to 10 invisible and transparent breakpoints. Multi-speed single step. Load/Copy/Create SYSTEM tapes. Uses only 2.5K and can be dynamically relocated to any address.
Mod 1 Cat # 1020-10 \$19.95
Mod 3 Cat # 1220-10 \$19.95

Note: these products are not available for level 1 machines.

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INVASION FORCE

Radio Shack's. Works with cosmetic differences. However, it can be greatly enhanced by some "ZAPS", taking advantage of the Model III's improved graphic character variety.

DISASSEM EDTASM

Apparat's disassembler. Works fine.

Apparat's Editor/Assembler works fine with the patch furnished in *Computronics*. By the way, those bytes may be "zapped" using the "F" utility of DEBUG; they occupy locations 1004B4 through 1004B6 in the DEBUG display.

2. Programs that Work Partially on the Model III

SUPERZAP

Apparat's. Only the DM, DMD8, and DFS functions work. All other fine disk sector related functions are blocked.

3. Programs that do Not Work on the Model III

DIRCHECK

Apparat's.

LMOFFSET

Apparat's. Both utilities are blocked. Access to directory is not allowed in DIRCHECK's case.

Model III DOS is a great improvement over the Model I. The new F function for DEBUG makes it a

powerful utility. BUILD and DO are more powerful than Apparat's CHAIN. However, it lacks a utility like DIRCHECK and the power of SUPERZAP for disk operations, although DIR and FREE display quite a bit more information than the Model I.

I especially dislike being unable to access the System Files and the Directory, as I usually translate most of these program's promptings to Spanish for the convenience of my system's users.

(Thanks to C. Roberto Linde, 25 Calle 9-86, Zona 11, Granai & Townson II, Guatemala, C.A.)

Model III Disks

Micro Mainframes, 714 Alhambra Blvd., Sacramento, CA 95816 is a company "dedicated to the production of high quality peripherals and operating systems for TRS-80 computers." In its current catalogue, the company offers Winchester host adaptors for the Models I and III and several other useful peripherals.

Two types of Floppy Disk Controllers are offered for the Model III. The FDC-III-A (priced at \$595) accommodates both 5-1/4 inch and 8 inch drives, mix or match, single or double density, while the FDC-III-B (\$325) accommodates only 5-1/4 inch drives, but is also available in kit form (\$195).

continued on page 54

RUBIK'S CUBE

Gordon Speer

I think we can assume that all of you have experienced the frustration of Rubik's cube, from the Ideal (!) Toy Company. Ideal offers a 14-page book on how to solve the puzzle, but that would take away some of the challenge of solving it. It may be that the reason more people don't achieve a solution on their own is that the cubes they are working on are already hopelessly messed up. With this in mind, I offer a program which displays all six faces of the cube opened out with the six colors labeled in their original orientations. Using appropriate keys you can rotate the parts of the cube in any direction and see what arrangements you get. The advantage to doing this on your computer is that you get a new fresh cube to start on whenever you run the program.

There are 18 rotations of the cube, which are operated by the keys listed in lines 810-830. If you don't have a 10 key pad you will probably want to change those on 820. Just pick out a set of 6 keys, 2 wide and 3 high, and put their ASCII values in lines 970-1020.

Our local TV station showed an 11 year old boy solving a shuffled cube in 3 minutes. Can any of you top that?

```

100 'RUBIK'S CUBE
110 CLEAR 1000
120 DEFSTR A,C,T      'INKEY$,COLORS,TEMPORARY STORAGE
130 DIM C(3,3,3)      'COLORS OF SMALL CUBE FACES
140 FOR V=1 TO 3      'VERTICAL LEVEL, TOP TO BOTTOM
150 FOR H=1 TO 3      'HORIZONTAL, FROM LEFT TO RIGHT
160 FOR D=1 TO 3      'DEPTH, FORE TO AFT
170 READ C(V,H,D)     'COLORS OF SURFACES
180 'TOP PLANE IS RED, FRONT WHITE, LEFT GREEN, RIGHT ORANGE,
    BOTTOM BLUE, REAR YELLOW
190 DATA RGW,RG-,RGY,R-W,R--,R-Y,ROW,RO-,ROY
200 DATA -GW,-G-,GY,-W,-,--,Y,-OW,-O-,OY
210 DATA BGW,BG-,BGY,B-W,B--,B-Y,BOW,BO-,BOY
220 NEXT D,H,V
230 '      PRINT CURRENT LOCATIONS OF COLORS
240 CLS:PRINT CHR$(23); 'CLEAR SCREEN-WIDE LETTERS
250 PRINT @ 64,;
260 LET V=1           'TOP
270 LET W=1           'WHICH PLANE SHOWS? TB=1, LR=2,
    FH=3
280 FOR D=3 TO 1 STEP -1 'DEPTH
290 PRINT @ 272-64*D,;
300 FOR H=1 TO 3
310 GOSUB 1640
320 NEXT H
330 NEXT D
340 FOR V=1 TO 3
350 PRINT @258+64*V,;

```

```

360 LET H=1
370 LET W=2
380 FOR D=3 TO 1 STEP -1
390 GOSUB 1640
400 NEXT D
410 PRINT @272+64*V,;
420 LET D=1
430 LET W=3
440 FOR H=1 TO 3
450 GOSUB 1640
460 NEXT H
470 PRINT @288+64*V,;
480 LET H=3
490 LET W=2
500 FOR D=1 TO 3
510 GOSUB 1640
520 NEXT D
530 PRINT @304+64*V,;
540 LET D=3
550 LET W=3
560 FOR H=3 TO 1 STEP -1
570 GOSUB 1640
580 NEXT H
590 NEXT V
600 LET V=3
610 LET W=1
620 FOR D=1 TO 3
630 PRINT @ 528+64*D,;
640 FOR H=1 TO 3
650 GOSUB 1640
660 NEXT H
670 NEXT D
680 IF POINT(1,12)=-1 THEN 800 'ALREADY FRAMED
690 PRINT @164,"RUBIK'S CUBE"; 'TITLE
700 PRINT @ 16,STRING$( 8,131); 'EDGES
710 PRINT @258,STRING$(30,131);
720 PRINT @514,STRING$(30,131);
730 PRINT @784,STRING$( 8,131);
740 FOR Y=12 TO 24
750 SET(1,Y):SET(93,Y):SET(124,Y)
760 NEXT Y
770 FOR Y=0 TO 36
780 SET(29,Y):SET(61,Y)
790 NEXT Y
800 '      INPUT CHANGES
810 'ROTATE LONGITUDINALLY (UP ARROW) Q W, (DOWN ARROW) A S
820 'ROTATE HORIZONTALLY (L OR R) 7 4 1, 9 6 3
830 'ROTATE TRANSVERSELY (CW OR CCW) (LEFT ARROW) L <, (RIGHT
    ARROW) + > (NO SHIFTS)
840 LET A$=INKEY$:IF A$="" THEN 840
850 IF ASC(A$)=91 THEN H=1:GOTO 1040
860 IF ASC(A$)=81 THEN H=2:GOTO 1040

```



```

870 IF ASC(A$)=87 THEN H=3:GOTO 1040
880 IF ASC(A$)=10 THEN H=1:GOTO 1110
890 IF ASC(A$)=65 THEN H=2:GOTO 1110
900 IF ASC(A$)=83 THEN H=3:GOTO 1110
910 IF ASC(A$)=46 THEN D=1:GOTO 1180
920 IF ASC(A$)=59 THEN D=2:GOTO 1180
930 IF ASC(A$)=9 THEN D=3:GOTO 1180
940 IF ASC(A$)=44 THEN D=1:GOTO 1250
950 IF ASC(A$)=76 THEN D=2:GOTO 1250
960 IF ASC(A$)=8 THEN D=3:GOTO 1250
970 IF ASC(A$)=55 THEN V=1:GOTO 1320
980 IF ASC(A$)=52 THEN V=2:GOTO 1320
990 IF ASC(A$)=49 THEN V=3:GOTO 1320
1000 IF ASC(A$)=57 THEN V=1:GOTO 1390
1010 IF ASC(A$)=54 THEN V=2:GOTO 1390
1020 IF ASC(A$)=51 THEN V=3:GOTO 1390
1030 GOTO 840
1040 ' ROTATE LONGITUDINALLY FRONT TO BACK
1050 T=C(1,H,3):TT=C(1,H,2)
1060 C(1,H,3)=C(1,H,1):C(1,H,2)=C(2,H,1)
1070 C(1,H,1)=C(3,H,1):C(2,H,1)=C(3,H,2)
1080 C(3,H,1)=C(3,H,3):C(3,H,2)=C(2,H,3)
1090 C(3,H,3)=T:C(2,H,3)=TT
1100 GOTO 1460
1110 'ROTATE LONGITUDINALLY BACK TO FRONT
1120 T=C(1,H,1):TT=C(1,H,2)
1130 C(1,H,1)=C(1,H,3):C(1,H,2)=C(2,H,3)
1140 C(1,H,3)=C(3,H,3):C(2,H,3)=C(3,H,2)
1150 C(3,H,3)=C(3,H,1):C(3,H,2)=C(2,H,1)
1160 C(3,H,1)=T:C(2,H,1)=TT
1170 GOTO 1460
1180 'ROTATE TRANSVERSELY CLOCKWISE
1190 T=C(1,3,D):TT=C(1,2,D)
1200 C(1,3,D)=C(1,1,D):C(1,2,D)=C(2,1,D)
1210 C(1,1,D)=C(3,1,D):C(2,1,D)=C(3,2,D)
1220 C(3,1,D)=C(3,3,D):C(3,2,D)=C(2,3,D)
1230 C(3,3,D)=T:C(2,3,D)=TT
1240 GOTO 1520
1250 'ROTATE TRANSVERSELY COUNTERCLOCKWISE
1260 T=C(1,1,D):TT=C(1,2,D)
1270 C(1,1,D)=C(1,3,D):C(1,2,D)=C(2,3,D)
1280 C(1,3,D)=C(3,3,D):C(2,3,D)=C(3,2,D)
1290 C(3,3,D)=C(3,1,D):C(3,2,D)=C(2,1,D)
1300 C(3,1,D)=T:C(2,1,D)=TT
1310 GOTO 1520
1320 'ROTATE HORIZONTALLY LEFT
1330 T=C(V,1,1):TT=C(V,2,1)
1340 C(V,1,1)=C(V,3,1):C(V,2,1)=C(V,3,2)
1350 C(V,3,1)=C(V,3,3):C(V,3,2)=C(V,2,3)
1360 C(V,3,3)=C(V,1,3):C(V,2,3)=C(V,1,2)
1370 C(V,1,3)=T:C(V,1,2)=TT
1380 GOTO 1580
1390 'ROTATE HORIZONTALLY RIGHT
1400 T=C(V,1,1):TT=C(V,1,2)
1410 C(V,1,1)=C(V,1,3):C(V,1,2)=C(V,2,3)
1420 C(V,1,3)=C(V,3,3):C(V,2,3)=C(V,3,2)
1430 C(V,3,3)=C(V,3,1):C(V,3,2)=C(V,2,1)

```

```

1440 C(V,3,1)=T:C(V,2,1)=TT
1450 GOTO 1580
1460 ' EXCHANGE COLORS - LONGITUDINALLY
1470 FOR V=1 TO 3
1480 FOR D=1 TO 3
1490 C(V,H,D)=MID$(C(V,H,D),3,1)+MID$(C(V,H,D),2,1)+
MID$(C(V,H,D),1,1)
1500 NEXT D,V
1510 GOTO 250
1520 'EXCHANGE COLORS - TRANSVERSELY
1530 FOR V=1 TO 3
1540 FOR H=1 TO 3
1550 C(V,H,D)=MID$(C(V,H,D),2,1)+MID$(C(V,H,D),1,1)+
MID$(C(V,H,D),3,1)
1560 NEXT H,V
1570 GOTO 250
1580 'EXCHANGE COLORS - HORIZONTALLY
1590 FOR D=1 TO 3
1600 FOR H=1 TO 3
1610 C(V,H,D)=MID$(C(V,H,D),1,1)+MID$(C(V,H,D),3,1)+
MID$(C(V,H,D),2,1)
1620 NEXT H,D
1630 GOTO 250
1640 PRINT " ";MID$(C(V,H,D),W,1);'SUBROUTINE TO PRINT COLORS
1650 RETURN

```

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HOUSEHOLD SECURITY

Andrew S. Braunstein

This program is designed to be run on a TRS-80 with 32K and one disk drive.

Have you ever had trouble keeping track of all your valuables for the insurance company or for tax purposes? Do you make up lists on pieces of paper and end up making new ones every few months because the old one is too long, worn out, has too many cross-outs, or you just plain lose it?

This program might be just the answer for you. The best way to use it is to keep updating the disk file whenever you buy something new or take another family heirloom to the local dump. Twice a year you should list the contents of the data file on your printer using the (P) command. Then put the list in a safe deposit box, office safe, fireproof cabinet, or some place protected. Using this method, you will always have an up-to-date listing of your important possessions, their values and serial numbers.

The first thing you must do, the first time you run the program, is to use the (G) command to set up the initial file. Thereafter, using this command will kill all previous data and start over. The (A) command adds new items to the file. The (D) command deletes a specified file. The (I) command lists the files according to common parameters such as manufacturer, price, model, etc. The (L) command lists all the files on the screen.

Please note that a flashing equals on the screen (====) indicates to press any key to continue. If the price of an item is unknown, then enter the word **unknown**. You must enter the price with all decimal points, but without the dollar sign. You may wish to change the CLEAR and DIM statements in line 2 to match your own needs. You might also consider a fancier printing routine (printing a certain number of files per page or adding a top of form function).

```
10 ' *****
11 ' **  HOUSEHOLD  SECURITY  **
12 ' **                VERSION 2.05                **
13 ' **      (C)1981 BY ANDREW S. BRAUNSTEIN      **
14 ' *****
20 CLEAR 10000 : DIM A$(5,200) : DEFINT A-Z
30 CLS : PRINT STRING$(64,61) : PRINT TAB(18) "RECORD OF
HOUSEHOLD ITEMS" : PRINT STRING$(64,61) :
PRINT TAB(20) "M A S T E R   M E N U" : PRINT
40 PRINT TAB(22) "<A>DD ITEMS TO FILE
41 PRINT TAB(22) "<D>ELETE FILE(S)"
42 PRINT TAB(22) "<E>ND SESSION"
43 PRINT TAB(22) "<G>ENERAL INITIALIZE"
44 PRINT TAB(22) "<I>NDEX OF COMMON FACTORS"
50 PRINT TAB(22) "<L>IST STORED ITEMS
51 PRINT TAB(22) "<M>ODIFY FILE"
52 PRINT TAB(22) "<P>RINT ITEM LIST"
```

```
53 PRINT @ 896, ">ENTER SELECTION:"
60 K$=INKEY$ : PRINT @ 914, CHR$(176) : FOR P=1 TO 200 :
NEXT : IF K$ = "" THEN PRINT @ 914, " " : FOR P=1 TO 200 :
NEXT : GOTO 60 ELSE PRINT @ 914, K$ : FOR P=1 TO 200 : NEXT
70 IF K$ = "P" THEN 560 ELSE IF K$ = "I" THEN 360 ELSE IF
K$ = "L" THEN 350 ELSE IF K$ = "A" THEN 220 ELSE IF K$ = "D"
THEN 470 ELSE IF K$ = "M" THEN 240 ELSE IF K$ = "E" THEN CLS :
END ELSE IF K$ = "G" THEN 340 ELSE PRINT @ 896, CHR$(30)
"INVALID REQ 220
75 FOR X=1 TO 800 : NEXT : PRINT @ 896, ">ENTER SELECTION:" :
GOTO 60
80 CLS : PRINT "FILE #"; MID$(STR$(A),2) : PRINT :
INPUT ">WHO IS THE MANUFACTURER"; A$(1,A) :
INPUT ">WHAT IS THE ITEM"; A$(2,A)
90 INPUT ">WHAT IS THE MODEL"; A$(3,A)
100 INPUT ">WHAT IS THE SERIAL NUMBER"; A$(4,A)
110 INPUT ">WHAT IS THE ESTIMATED VALUE"; A$(5,A) :
IF A$(5,A) <> "UNKNOWN" THEN A$(5,A)="$"+A$(5,A) :
RETURN : ELSE RETURN
120 F=-256 : K=A : CLS : FOR P=1 TO K : F=F+256
130 PRINT @ F, "MANUFACTURER/ITEM:"; TAB(22) A$(1,P);
CHR$(47); A$(2,P)
140 PRINT "MODEL/SERIAL NUMBER:"; TAB(22) A$(3,P);
CHR$(47); A$(4,P)
150 PRINT "ESTIMATED VALUE:"; TAB(22) A$(5,P)
160 PRINT STRING$(63,61);
170 IF P/4 = INT(P/4) THEN 180 ELSE 200
180 O$=INKEY$ : PRINT @ 1019, STRING$(4,61) :
FOR X=1 TO 200 : NEXT : PRINT @ 1019, STRING$(4,32) :
FOR X=1 TO 200 : NEXT : IF O$ = "" THEN 180 ELSE CLS : F=-256
190 IF P = K THEN 30
200 NEXT P
210 O$=INKEY$ : PRINT @ F+252, STRING$(4,61) :
FOR X=1 TO 200 : NEXT : PRINT @ F+252, STRING$(4,32) :
FOR X=1 TO 200 : NEXT : IF O$ = "" THEN 210 ELSE 30
220 GOSUB 540
230 A=A+1 : GOSUB 80 : PRINT : PRINT : INPUT ">DO YOU WANT
TO ADD MORE"; W$ : IF LEFT$(W$,1) = "Y" THEN 230 ELSE PRINT :
PRINT "PLEASE STANDBY....." : PRINT "WRITING NEW FILE(S)
TO DISK" : GOSUB 550 : GOTO 30
240 H=23 : GOSUB 360 : CLS :
PRINT "M O D I F I C A T I O N   M E N U" : GOSUB 380 :
H=0 : GOTO 260
250 W=0 : PRINT @ 960, CHR$(30) : LINE INPUT ">TYPE '0'
TO CONTINUE, OR # OF RECORD TO MODIFY:" : W$ : W=VAL(W$) :
IF W = 0 THEN RETURN
260 V$=STRING$(3,27) : CLS : PRINT "FILE #"; MID$(STR$(W),2) :
PRINT : PRINT : PRINT "MANUFACTURER:" : A$(1,W) : GOSUB 330 :
IF G$ = "Y" THEN 270 ELSE PRINT :
INPUT ">WHO IS THE MANUFACTURER"; A$(1,W) : PRINT V$
270 PRINT STRING$(3,27) CHR$(31) : PRINT "ITEM:" : A$(2,W) :
GOSUB 330 : IF G$ = "Y" THEN 280 ELSE PRINT :
INPUT ">WHAT IS THE ITEM"; A$(2,W) : PRINT V$
280 PRINT STRING$(3,27) CHR$(31) : PRINT "MODEL:" :
A$(3,W) : GOSUB 330 : IF G$ = "Y" THEN 290 ELSE PRINT :
INPUT ">WHAT IS THE MODEL"; A$(3,W) : PRINT V$
```

```

290 PRINT STRING$(3,27) CHR$(31) : PRINT "SERIAL NUMBER:
" A$(4,W) : GOSUB 330 : IF G$ = "Y" THEN 300 ELSE PRINT :
INPUT ">WHAT IS THE SERIAL NUMBER"; A$(4,W) : PRINT V$
300 PRINT STRING$(3,27) CHR$(31) : PRINT "PRICE: ";
A$(5,W) : GOSUB 330 : IF G$ = "Y" THEN 310 ELSE PRINT :
INPUT ">WHAT IS THE PRICE"; A$(5,W) : PRINT V$
310 CLS : PRINT "FILE #"; MID$(STR$(W),2) : PRINT :
PRINT "MANUFACTURER: "; A$(1,W) : PRINT "ITEM: ";
STRING$(11," "); A$(2,W) : PRINT "MODEL: "; STRING$(10," ");
A$(3,W) : PRINT "SERIAL NUMBER: "; A$(4,W) : PRINT "PRICE: ";
STRING$(10," "); A$(5,W)
320 PRINT : GOSUB 330 : IF G$ = "Y" THEN PRINT :
PRINT "PLEASE STANDBY....." : PRINT "WRITING MODIFIED FILE
TO DISK" : GOSUB 550 : H=0 : GOTO 30 ELSE 260
330 G$ = "Y" : INPUT "IS THIS CORRECT (Y/N)"; G$ : RETURN
340 Q$="N" : PRINT @ 832, " " : PRINT @ 896, "THIS SETS UP
A NEW FILE AND WILL DESTROY ALL PREVIOUS DATA" :
INPUT "DO YOU WISH TO CONTINUE (Y/N)"; Q$ :
IF Q$ <> "Y" THEN 30 ELSE : L=0 : OPEN "0",1,"SAFEDATA/TXT" :
PRINT#1,L : CLOSE : A=0 : SS=0 : GOTO 220
350 GOSUB 540 : GOSUB 120 : GOTO 30
360 GOSUB 540 : IF H = 23 THEN RETURN
370 H=0 : CLS : PRINT "I N D E X   M E N U"
380 PRINT : PRINT TAB(10); "PARAMETERS:" :
PRINT TAB(17); "(1) MANUFACTURER"
381 PRINT TAB(17); "(2) ITEM"
382 PRINT TAB(17); "(3) MODEL"
383 PRINT TAB(17); "(4) SERIAL NUMBER"
384 PRINT TAB(17); "(5) PRICE"

```

```

385 PRINT @ 576, ">ENTER SELECTION:";
390 SS=INKEY$ : PRINT @ 594, CHR$(176); : FOR P=1 TO 200 :
NEXT : IF SS = "" THEN PRINT @ 594, " " : FOR P=1 TO 200 :
NEXT : GOTO 390 ELSE PRINT @ 594, S$ : FOR P=1 TO 200 : NEXT
400 ON VAL(SS) GOTO 410,410,410,410,410 : PRINT @ 576,
CHR$(30) "ILLEGAL RESPONSE" : FOR P=1 TO 800 : NEXT :
PRINT @ 576, ">ENTER SELECTION:" : GOTO 390
410 I=VAL(SS) : IF I = 1 THEN R$="MANUFACTURER" ELSE
IF I = 2 THEN R$="ITEM" ELSE IF I = 3 THEN R$="MODEL"
ELSE IF I = 4 THEN R$="SERIAL NUMBER" ELSE R$="PRICE"
420 CLS : PRINT @ 0, "#"; : PRINT @ 5, R$; :
PRINT @ 32, "#"; : PRINT @ 37, R$ : PRINT STRING$(64,61);
430 O=128 : FOR P=1 TO L : PRINT @ 0, MID$(STR$(P),2);"; :
PRINT @ 0+5, A$(I,P); : O=O+64 : IF O = 960 THEN O=160 :
ELSE IF O = 992 AND H = 23 THEN O=128 : GOSUB 250 :
GOSUB 460 ELSE IF O = 992 THEN O=128 : GOSUB 450
440 IF P = L THEN GOSUB 450 : H=0 : GOTO 30 ELSE NEXT P
450 IF H = 23 THEN GOTO 250 ELSE O$=INKEY$ : PRINT @ 1019,
STRING$(4,61); : FOR X=1 TO 200 : NEXT : PRINT @ 1019,
STRING$(4,32); : FOR X=1 TO 200 : NEXT : IF O$ = "" THEN
450 ELSE IF P = L THEN RETURN
460 CLS : PRINT @ 0, "#"; : PRINT @ 5, R$; : PRINT @ 32,
"#"; : PRINT @ 37, R$ : PRINT STRING$(64,61); : RETURN
470 GOSUB 540
480 FOR W=1 TO L : CLS : PRINT "FILE #"; MID$(STR$(W),2) :
PRINT : PRINT "MANUFACTURER: "; A$(1,W)
481 PRINT "ITEM: "; STRING$(11," "); A$(2,W)

```

continued on page 58

YOU CAN PICK THE WINNERS!

PRO-FOOTBALL-PIX, or PRO-PIX, is the culmination of over five years of development and use of a utility program to track the progress of the 28 professional U. S. football teams during the regular 224-game (16 weeks and 14 games per week) season. PRO-PIX made its public debut in 1980 under a slightly different name after extensive testing and was very successful, receiving many plaudits from users, and requests for a 1981 version. PRO-PIX is basically an updated version for 1981, with several subtle changes in presentation format. The prediction data has been modified slightly and information is included herein for updating the program for successive seasons.

PRO-PIX is designed for use on TRS-80 Models 1 & 3, APPLE II PLUS or APPLE II, with APPLESOFT in ROM, or ATARI 400/800 computers with at least 32K of memory. It will operate with data-handling to either Disk or Tape.

Features of PRO-PIX may be summarized as follows:

- List SCHEDULES by team or week of interest
- List SCORES of all games played, by team or week
- List current STANDINGS in division
- Show PREDICTIONS for games to be played, by team or week.
- PRINT any screen that displays data
- UPDATE the program by entering weekly scores
- Set up a new SEASON



PRO-PIX '81

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SYMBOL TABLE

Kenneth R. Meyer

Have you ever spent hours pouring over your code trying to find a bug before discovering that you typed A instead of A% or BD instead of DB or C instead of C(0)? Maybe in the course of writing or modifying a long program you have asked, "Have I used the symbol ZT in this program before?". Possibly you have wondered how BASIC keeps track of the variables used in a program. If these problems or questions have arisen for you then you will be interested in the utility program given below.

Simple typing errors are sometimes difficult to find since they are so innocuous and keeping track of the symbols is an arduous task so it would be useful to have a listing of all symbols written by the computer itself. Clearly keeping a note pad and pencil handy will not catch the typos. It would not be too difficult to write a program which searches through a given program finding all the symbols — clearly BASIC does this when it is executing your program. But if BASIC already identifies the symbols, and surely it wouldn't be so foolish as to forget a symbol, then all we need to do is find BASIC's symbol table and list it. This is exactly what the program given below does.

This sequence of statements, which I'll call SYMTAB, is not a program by itself since it is meant to list the symbols used by another program. In fact it suppresses the symbols (Q4% to Q9%) it uses (see line 65052). After SYMTAB has been written and debugged it should be kept on tape or disk so that it can be loaded BEFORE you start writing a new program since it is useful during the debugging period. The high numbers in SYMTAB allow you to type the new program before it with little fear of conflicting line numbers, but you must remember to have the new program transfer control to SYMTAB after execution. Thus replace all END statements with GOTO 65000 during the writing period and of course replace them when you are finished. Now, during the writing period, any trial run will yield a complete list of all the single variables and all the arrays used during the execution of the program. After the program is fully operational SYMTAB can simply be DELETED. To continue the listing after a full screen or to get the array table type any key.

SYMTAB was written for a Model III and uses the scroll protection feature, so for the Model I remove the POKes in lines 65000 and 65140. In the listing of SYMTAB given below there is a short program (lines 110 to 300) which does nothing but was included to illustrate how SYMTAB works. Omit it. Those readers who are not interested in the short description of the organization of the symbol table can skip the rest of this discussion.

As you may have read, BASIC uses some of low RAM to keep information about the organization of memory and other bookkeeping information. Then it uses low RAM to store your program followed by the storage space for variables and arrays. High RAM is used to store character strings and arrays. A little reflection will make it obvious that BASIC must keep information about the variables used in a program in some systematic way. When the BASIC interpreter encounters the statement

126 Z=0

it must know whether it has already assigned a storage space to Z and what kind of variable Z is. If this is first occurrence of Z, then the interpreter must allocate a storage space to Z, leave a note that Z already exists and what type of variable it is, and of course place 0 in the storage place. If this is not the first occurrence of Z, then the interpreter must find the storage space it has previously assigned to Z and then place 0 in it. Of course all this must be done very quickly, so BASIC must know where to begin the search. Thus you find in the low RAM three pairs of bytes which hold, respectively, the address of the beginning of the symbol table, the beginning of the array table (and hence the end of the symbol table), and the beginning of the free memory (and hence the end of the array table). These three addresses are stored in six consecutive bytes starting at 16633 for both Model III and I (see 65020 and 65030). Thus the first thing that SYMTAB does is to compute the address of the beginning of the symbol table and the address of the array table and stores these addresses in Q8% and Q9% respectively. The variable Q8% is updated as each new symbol is found so that at any time it points to the beginning of the listing of a new variable. The first thing in the listing for a single variable is the code for the type of variable: 2 for integer, 3 for character string, 4 for single precision, and 8 for double precision. The next two bytes contain the ASCII code for the symbol in reverse order (that is, the symbol AB is stored BA). For numeric variables the next 2, 4 or 8 bytes is the storage space for the variable, and for string variables the next three bytes store the current length of the string followed by the address in high RAM where the string is stored. (Note the correspondence between the code for the type of variable and the amount of space used to store it in the symbol table!) Thus if your program used a variable AZ% and it contained 0, the five bytes in the symbol table for this variable would contain

2 90 65 0 0

since the ASCII code for A is 65 and for Z is 90.

The array table follows the symbol table and has a similar organization. The first three bytes for an array contain the code for type and the ASCII for the symbol. The next two bytes contain the number of bytes to be skipped in order to find the next listing in the array table. Thus information is kept since the table must be scanned quickly and the length of the entries vary greatly. The next byte contains the number of subscripts and the next group of pairs of bytes contain the maximum range of the subscripts in reverse order. For numeric arrays there follows the storage space for the entries in the array and for string arrays the addresses of where the strings are stored.

```

100 REM          SYMTAB
110 REM          BY
120 REM          KENNETH R. MEYER
130 REM
140 REM The program given in lines 200 to 280 is a sample
150 REM which is included to show how SYMTAB works. It
160 REM should be replaced by the program you are presently
170 REM developing. SYMTAB begins at line 65000.
180 REM
190 REM
200 DX=0 : DY=0 : DZ=0
210 D$="ABC" : E$="XYZ" : F$=""
220 D!=0 : E!=0 : F!=0

```

```

230 D#=0 : E#=0 : F#=0
240 D%=0 : E%=0 : F%=0
250 A(1,1)=0
260 DIM B!(1,2,3,4),D$(4),E$(3,1),F$(1,5)
270 REM
280 REM
290 REM
300 REM
65000 CLS : POKE 16916,2
65010 PRINT @ 22, "SYMBOL TABLE" : PRINT
65020 Q4%=0 : Q5%=0 : Q6%=0 : Q7%=16633
65030 Q8%=PEEK(Q7%)+PEEK(Q7%+1)*256
65040 Q9%=PEEK(Q7%+2)+PEEK(Q7%+3)*256
65050 IF Q8% = Q9% THEN 65110
65052 IF PEEK(Q8%) = 2 AND PEEK(Q8%+1) > 51 AND PEEK(Q8%+1)
< 58          AND PEEK(Q8%+2) = 81 THEN Q8%=Q8%+5 : GOTO 65050
65055 Q6%=Q6%+1
65057 GOSUB 65500
65060 PRINT CHR$(PEEK(Q8%+2));CHR$(PEEK(Q8%+1)),
65070 IF PEEK(Q8%) = 2 THEN PRINT "INTEGER", : Q8%=Q8%+5 :
GOTO 65050
65080 IF PEEK(Q8%) = 3 THEN PRINT "STRING", : Q8%=Q8%+6 :
GOTO 65050
65090 IF PEEK(Q8%) = 4 THEN PRINT "SINGLE", : Q8%=Q8%+7 :
GOTO 65050
65100 PRINT "DOUBLE", : Q8%=Q8%+11 : GOTO 65050
65110 Q6%=Q6%+1 : GOSUB 65500 : PRINT "END OF SYMBOLS"
65118 Q6%=90 : GOSUB 65500
65120 CLS : Q6%=0 : PRINT @ 20,"ARRAY TABLE      "
65122 PRINT "SY";TAB(4);"TYPE";TAB(15);"DIM";TAB(23);"RANGES"
65130 Q9%=PEEK(Q7%+4)+PEEK(Q7%+5)*256
65140 IF Q8% = Q9% THEN PRINT "END OF ARRAYS" :
POKE 16916,0 : END

```

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```

65150 Q6%=Q6%+2 : GOSUB 65500
65160 PRINT CHR$(PEEK(Q8%+2));CHR$(PEEK(Q8%+1));TAB(4);
65170 IF PEEK(Q8%) = 2 THEN PRINT "INTEGER"; : GOSUB 65400 :
GOTO 65140
65180 IF PEEK(Q8%) = 3 THEN PRINT "STRING"; : GOSUB 65400 :
GOTO 65140
65190 IF PEEK(Q8%) = 4 THEN PRINT "SINGLE"; : GOSUB 65400 :
GOTO 65140
65200 PRINT "DOUBLE"; : GOSUB 65400 : GOTO 65140
65400 Q5%=PEEK(Q8%+5)
65410 PRINT TAB(15);Q5%;TAB(23)
65415 IF Q5% = 1 THEN 65443
65420 FOR Q4%=Q5%-1 TO 1 STEP -1
65430 PRINT " 0 -";PEEK(Q8%+6+2*Q4%)+PEEK(Q8%+7+2*Q4%)*256-1;
" ";
65440 NEXT
65443 PRINT " 0 -";PEEK(Q8%+6+2*Q4%)+PEEK(Q8%+7+2*Q4%)*256-1
65450 Q8%=Q8%+PEEK(Q8%+3)+PEEK(Q8%+4)*256+5
65460 RETURN
65500 IF Q6% > 26 AND INKEY$="" THEN 65500 : ELSE RETURN

```

Kenneth R. Meyer
1314 Ault View Avenue
Cincinnati, Ohio 45208

continued from page 47

Three types of Winchester Host Adaptors are available, for the Models I, II, and III (priced at \$350, \$650, and \$350 respectively). These work with several types of hard disk drives, including drives made by Seagate Technology, RMS, Shugart Associates, Memorex, Quantum, CDC Finch, and Data Peripherals, with more to come. Storage capacity of these drives is 5 to 56 megabytes. The Host Adaptors are not disk controllers. In order to have a complete system, you must purchase the appropriate Data Technology disk controller for your particular drive. These are also available from Micro Mainframes.

MMF's catalog also includes a device called "Disk-Fix" for the Model I (\$29.95), which eliminates timing errors that are still present even when a Percom Data Separator has been installed; MAXIDOS for the Model III (\$169.95), which is completely TRSDOS-compatible with a number of additional features including support of 8 inch drives; Output Manager™ Printer Multiplexer (\$129.95), allowing two printers to be used simultaneously; and floppy disk drives — single and double headed, 40, 80, and 160 tracks.

continued from page 39


Program # 2: Circles

```

5 REM CIRCLE
10 CLS:PMODE 3,1:PCLS:SCREEN 1,1
20 AA=5:Y=127:Z=95
30 A=6:B=7:C=8:D=95:E=62:F=31
40 CIRCLE(Y,Z),D,A
50 CIRCLE(Y,Z),E,B
60 CIRCLE(Y,Z),F,C
70 REM CIRCLE LOOP
80 DD=D-1:EE=E-1:FF=F-1
90 CIRCLE(Y,Z),DD,A
100 CIRCLE(Y,Z),DD,A
110 CIRCLE(Y,Z),EE+1,AA
120 CIRCLE(Y,Z),EE,B
130 CIRCLE(Y,Z),FF+1,AA
140 CIRCLE(Y,Z),FF,C
150 DD=DD+1:EE=EE+1:FF=FF+1
160 IF FF=1 THEN FF=D : GOTO 90
170 IF EE=1 THEN EE=D : GOTO 90
180 IF DD=1 THEN DD=D : GOTO 90
190 Q=RND(255) : R=RND(191)
200 S=RND(8) : PSET(Q,R,S)
210 T=RND(12) : PLAY "V5;L220;"+STR$(T)
220 GOTO 90
230 END

```

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QUESTIONS AND ANSWERS

Conducted by Hubert S. Howe, Jr.

QUESTION

from Woody Beckman, 17641 Birch Tree Lane, Irvine, CA 92715: I recently renewed my subscription to your excellent magazine and received the free cassette. I have tried several times to store the Adventure program on disk but have not been successful. I would appreciate your assistance in this undertaking. My system includes NEWDOS/80, and I have tried the LMOFFSET program without success. I wonder if there is some further step which needs to be taken.

ANSWER

LMOFFSET is one of those tricky but useful programs whose operation is explained in a jargon comprehensible only to Apparat. You can use it for this purpose if you follow these steps:

1. Position the tape at the start of the ADVENT file. On my copy, this requires three previous CLOADs.

2. Run LMOFFSET, and tell it to load from tape rather than disk. This takes several minutes, for it is a long program.

LMOFFSET comes back with the information that the program loads 4300-7FFF, with the entry point 4350. This means that it overlaps the DOS resident area.

3. To the question "New Load Base Address (Hex)" reply 8000. When it asks if the appendage should be suppressed, say "No (N)." The next time it asks this question, simply hit Enter.

4. When it asks if interrupts should be disabled, say "Yes," but I don't think this matters.

5. Save the program on a command file, such as "ADVENT/CMD."

6. Finally, and most important, because this is probably what you did not do before, when you are ready to run the program you must first re-boot the DOS (typing BOOT will do for NEWDOS/80), but as you do this *hold down the shift and up arrow keys*. This will cause the ROM keyboard driver to be used instead of NEWDOS/80's debounce routine, which sits in the middle of the Adventure program.

This will work.

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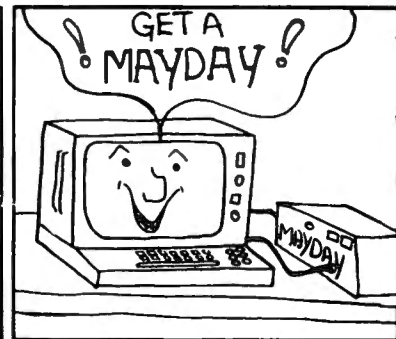
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QUESTION

from Ernest L. Diefenderfer, 4530 East Sharon Drive, Phoenix, AZ 85032: In Questions and Answers in the February 1981 issue, you wrote about formatting diskettes to 80 tracks with NEWDOS/80. I tried to do it by following your instructions, but I did not have any success.

I would like to ask you to give me a step-by-step proces for doing it. I have two Percom TFD-100 disk drives which are rated at 40 tracks. When I format new diskettes, my NEWDOS/80 automatically formats the diskettes to 35 tracks. Could I format them to 80 tracks? Could you have a system residing on the new 40 or 80 track diskette you have just formatted?

ANSWER

First, you cannot format your 40-track drives to 80 tracks, but if you have NEWDOS/80 you can format them to 40 tracks with or without a system on the diskette. If you want to FORMAT a diskette for use in drives 1-3, you will use the FORMAT utility. If you want to BACK UP the system diskette to a 40-track drive, you would use COPY. In either case, after you get some 40-track diskettes prepared, you will have to use the PDRIVE command to specify that your drives can handle the 40-track capability, and then you will have to re-boot the system to be able to use it. We will describe the full process.

To make a 40-track system diskette, type:

`COPY :0=35 TO :1=40 mm/dd/yy`

where "mm/dd/yy" is the date. When this is done, leave the diskettes in the same drives and type:

`PDRIVE, :1, :0, DTC=40`

Now place the new diskette into drive zero and re-boot (either type BOOT or hit the reset button). When you ask for a directory of drive zero, it should say that it is 40 tracks.

To make some 40-track data diskettes, place the new ones into drive 1 and type:

`FORMAT, :1=40, DATADISK, mm/dd/yy, PASSWORD`

When you have finished formatting them, you still have to tell the system diskette that you have 40 tracks on drive 1, so type:

`PDRIVE, :0, :1, DTC=40`

Now you have a complete 40-track disk system.

* * * * *

Got a question about the TRS-80? Send it to Questions, H & E Computronics, 50 North Pascack Road, Spring Valley, New York 10977. If you wish a personal reply, please enclose a self-addressed, stamped envelope. ■

HELPFUL HINTS

Lower Case Driver

For those readers who have installed the R/S or the E. B. Garcia Jr. & Associates lower case modification, here is a driver program that will allow the user normal typewriter operation. I am including both an assembly language listing and a BASIC listing.

By the way, I am interested in designing a lower case modification that does not require a driver. Any readers interested in such a modification can call me at (213) 782-8045.

```
10 FOR I=32732 TO 32767
20 READ BYTE: POKE I,BYTE: NEXT I
30 POKE 16414,220: POKE 16415,127
40 DATA 221,110,3,221,102,4,218,154
50 DATA 4,221,126,5,183,40,1,119
60 DATA 121,254,32,218,6,5,254,128
70 DATA 210,166,4,203,119,40,2
80 DATA 238,32,195,125,4
```

Assembly Language Version

```
00100 LD L,(IX+03)
00110 LD H,(IX+04)
00120 JP C,049AH
00130 LD A,(IX+05)
00140 OR A
```

continued on page 58

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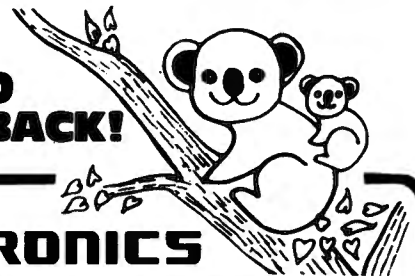
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Why Compilation improves performance

***Name Resolution** Term given to the process of identifying the value of a variable given its name. As a program runs, the interpreter builds a dictionary consisting of a chain of items each containing a variable name, data type and current value. Every time a variable is to be resolved the interpreter must sequentially search this dictionary. By contrast, ACCEL2 builds the variable dictionary once at compile time and thereafter can refer to the variable names by direct address, with no run-time search.

***Line Resolution** The interpreter has to take the line-number following a GOTO or GOSUB, convert it to binary, and then search the program sequentially to find the target line. At compile-time ACCEL2 generates single machine-instructions for GOTO or GOSUB using the actual address of the target line. For the interpreter, both name resolution and line resolution get slower as the program gets more complex, whereas for compiled code these two operations are independent of program size or number of variables.

***Computational Operations** The interpreter must parse each statement every time, find the one-byte codes that correspond to the operations, look ahead to the next operator to establish the precedence rules and check for data-type mismatch and conversion. Constants must be converted from character strings to internal binary. But under ACCEL2 constants are converted and embedded right in the 280 instruction stream, and operations are translated once and for all at compile-time into sequences of calls to ROM or the run-time component. INTEGER operations are actually turned into directly executing straight-line 280 code!

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continued from page 57

00150	JR	Z,\$+3
00160	LD	(HL),A
00170	LD	A,C
00180	CP	20H
00190	JP	C,0506H
00200	CP	80H
00210	JP	NC,04A6H
00220	BIT	6,A
00230	JR	Z,\$+4
00240	XOR	20H
00250	JP	047DH

(Thanks to Paul Scanlon, 6235 Kester Avenue, Van Nuys, CA 91405.)

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```

482 PRINT "MODEL:"; STRING$(10," "); A$(3,W)
483 PRINT "SERIAL NUMBER: "; A$(4,W)
484 PRINT "PRICE:"; STRING$(10," "); A$(5,W)
490 Z$="N": PRINT: INPUT ">DO YOU WISH THIS FILE DELETED
(Y/N)"; Z$: IF Z$ = "Y" THEN 500 ELSE 510
500 D$="N": INPUT ">ARE YOU SURE (Y/N)"; D$: IF D$ = "Y"
THEN A$(1,W)="-1.01": YW=1
510 NEXT W: IF YW <> 1 THEN 30 ELSE YW=0
520 PRINT @ 704, "PLEASE STANDBY.....": PRINT @ 768,
"NOW DELETING SPECIFIED FILE(S)"; R=0: FOR K=1 TO L:
IF A$(1,K) = "-1.01" THEN R=R+1: ELSE FOR X=1 TO 5:
A$(X,K-R)=A$(X,K): NEXT X
530 NEXT K: L=L-R: A=L: PRINT @ 768, "WRITING UPDATED
FILES TO DISK ";: GOSUB 550: GOTO 30
540 IF L = 0 OR A$(1,L) = "" THEN OPEN "I",1,"SAFEDATA/TXT":
INPUT#1, L: IF L = 0 THEN CLOSE: RETURN ELSE FOR Q=1 TO L:
FOR T=1 TO 5: INPUT#1, A$(T,Q): NEXT T,Q: CLOSE: SS=L:
A=L: RETURN ELSE RETURN
550 L=A: OPEN "O",1,"SAFEDATA/TXT": PRINT#1, L:
FOR Q=1 TO L: PRINT#1, A$(1,Q); ", "; A$(2,Q); ", ";
A$(3,Q); ", "; A$(4,Q); ", "; A$(5,Q): NEXT: CLOSE: SS=A:
RETURN
560 GOSUB 540: CLS: LINE INPUT ">ENTER TODAY'S DATE
(MM/DD/YYYY): "; Z$: PRINT "PREPARE PRINTER FOR OUTPUT OF
CURRENT FILE(S)": PRINT "PRESS <ENTER> TO CONTINUE"
570 O$=INKEY$: IF O$ = "" THEN PRINT @ 134, " ";
STRING$(7," ");: FOR U=1 TO 200: NEXT: PRINT @ 134,
"<ENTER>";: FOR U=1 TO 200: NEXT: GOTO 570
580 PRINT: PRINT: PRINT "PLEASE STANDBY.....":
PRINT "NOW LISTING CURRENT FILE(S) ON PRINTER"
590 LPRINT: LPRINT STRING$(63,61): LPRINT TAB(17)
"RECORD OF HOUSEHOLD ITEMS": LPRINT STRING$(63,61):
LPRINT TAB(45) "UPDATED "; Z$: LPRINT
600 FOR T=1 TO L: LPRINT "FILE #"; MID$(STR$(T),2):
LPRINT "MANUFACTURER/ITEM:"; TAB(22) A$(1,T); CHR$(47);
A$(2,T): LPRINT "MODEL/SERIAL NUMBER:"; TAB(22); A$(3,T);
CHR$(47); A$(4,T)
610 LPRINT "ESTIMATED VALUE:"; TAB(22) A$(5,T): LPRINT:
NEXT T: GOTO 30

```

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NOTE 4: Hard copy print out only.
NOTE 5: Four functions (+ - * /) only.
NOTE 6: Same as note #5 with a maximum of two calculated fields.
NOTE 7: Available as a separate program for \$99.95.
NOTE 8: 120 character maximum.
NOTE 9: Data structures defined in manual.
NOTE 10: 132 characters maximum.
NOTE 11: User option (files can be read from ascending or descending order).

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DATA MANAGEMENT PROGRAM COMPARISON CHART

FILE CAPACITY & FORMAT

	CCA DATA MANAGER	AIDS III with CALS	MAXI MANAGER	RADEX 10	PROFILE
Maximum # of disks per file	1	1	4	31	4
Maximum # of records per file	2450	Note 1	32,767	10,199	65,535
Maximum record length	249	254	800	255	255
Maximum # of characters per field	249	254	40	254	255
Maximum # of fields	24	20	20	127	153
Maximum # of characters per field label	15	10	19	12	765
Variable length records (pack sectors)	No	Note 2	Yes	No	No

FIELD TYPES

Alphanumeric	Yes	Yes	Yes	Yes	Yes
Numeric	Yes	Yes	Yes	Yes	No
Fixed decimal numeric	Note 4	Yes	Yes	No	No
Date (MM/DD/YY)	Yes	No	Yes	No	No
Extended date (MM/DD/YYYY)	No	No	Yes	No	No
Calculated equation	Note 5	Note 6	Yes	No	No
Permanent fields	Yes	No	No	No	No

SORTING

Machine language assisted	No	Yes	Yes	Note 7	Yes
Sort by any field	Yes	Yes	Yes		Yes
Number of Sort Key files	1	1	5		1
Numeric sort	Yes	Yes	Yes		No
Ascending sort	Yes	Yes	Yes		Yes
Descending sort	Yes	Yes	Note 11		Yes
Sort within a selected range	No	No	Yes		No
Sort multiple fields simultaneously	Yes	Yes	No		No

FILE MAINTENANCE

Fixed length input fields	Yes	Yes	Yes	Yes	Yes
Single key entry of common data	No	No	Yes	No	No
Single field EDIT selection	Yes	Yes	Yes	Yes	Yes
Skip record (next or previous)	Yes	Yes	Yes	No	Yes
Search & EDIT record	No	Yes	Yes	No	Yes
Search & DELETE record	No	Yes	Yes	No	No
Auto rejection of alphanumeric data in numeric field	Yes	No	Yes	No	No

RECORD SELECTION TECHNIQUES

Record number	Yes	Yes	Yes	Yes	No
Binary search (high speed)	No	No	Yes	No	No
Maximum # of simultaneous keys	1	4	10	31	1

RELATIONAL COMPARISONS

Equal	No	Yes	Yes	Yes	Yes
Not equal	No	Yes	Yes	No	Yes
Greater than	No	Yes	Yes	Yes	Yes
Less than	No	Yes	Yes	Yes	Yes
Instring	Yes	No	Yes	Yes	No
AND / OR	No	No	Yes	Yes	No
Wild card masking	No	No	Yes	No	No

PRINTING

User specified page title	Note 8	Yes	Yes	No	Note 10
User specified column headings	No	No	Yes	No	Yes
Automatic page numbering	Yes	Yes	Yes	Yes	Yes
Right justification	No	Yes	Yes	No	No
User defined column widths	Yes	No	Yes	Yes	Yes
User defined column separators	No	No	Yes	No	No
Keyboard entered columnar values	No	No	Yes	No	No
Merge data into form letters	No	No	Yes	No	No
Form filling applications	No	No	Yes	No	No
Columnar totals	Yes	Yes	Yes	No	No
Columnar subtotals generated upon change in a specific field	Yes	Yes	Yes	No	No
Built in screen print	No	No	Yes	No	No

MISCELLANEOUS

Cost	\$75.00	\$94.90	\$99.95	\$99.00	\$79.95
Punctuation allowed within data fields	Yes	?	Yes	Yes	Yes
Upper / Lower case	Note 3	Note 3	Yes	Note 3	Note 3
Built in RS-232-C driver	Note 3	Note 3	Yes	Note 3	Note 3
Built-in TRS-232 driver	Note 3	Note 3	Yes	Note 3	Note 3
Programmer's interface	Note 9	Note 9	Yes	No	Note 9
Sample DATA disk	No	No	Yes	No	No
Documentation (# of pages)	?	?	93	38	29

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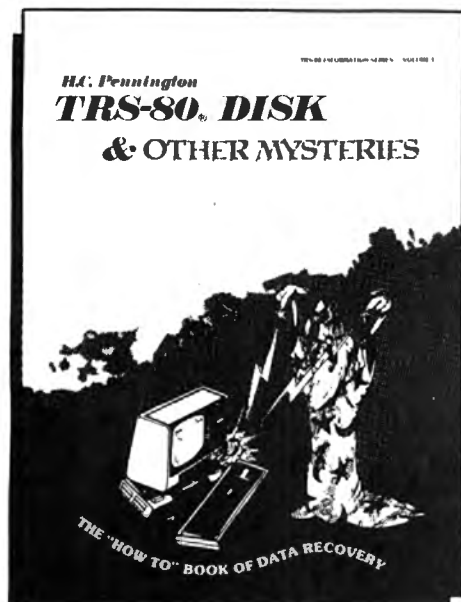
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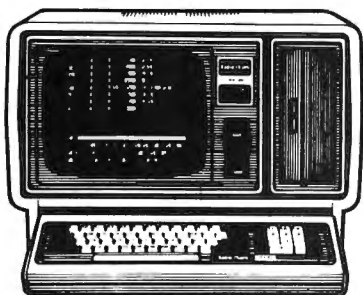
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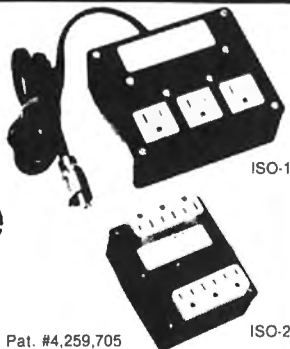


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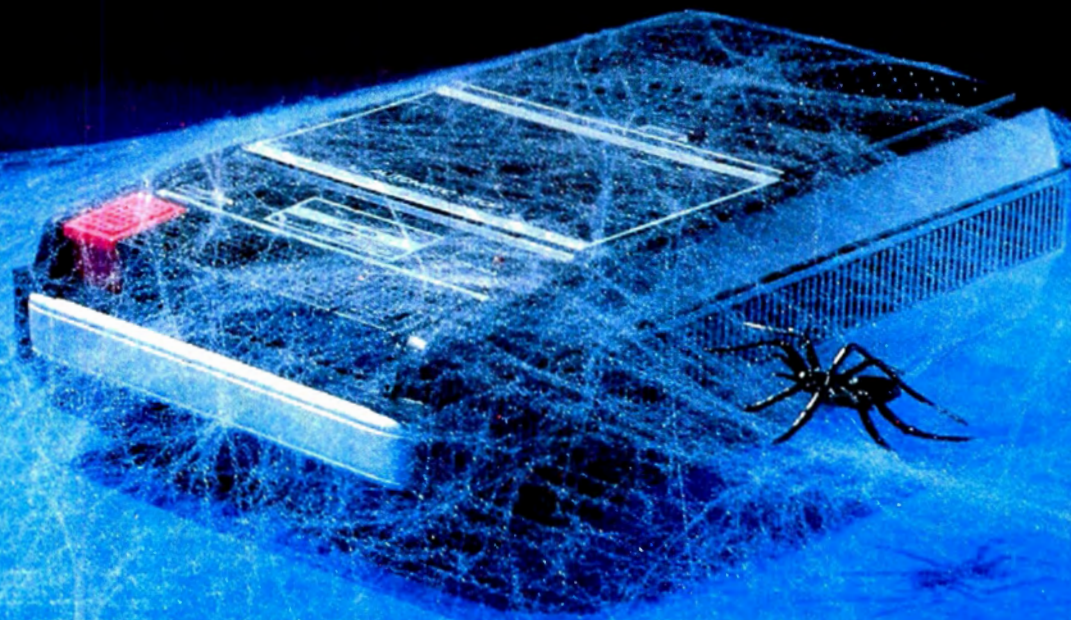
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